

Arab Republic of Egypt
Ministry of education
&technical education
Central Administration
of Book Affairs



Explore and Learn

Science

For
Preparatory Stage - Year 1

First Term



2018-2019



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Prepared by

Dr: Reda Al Sayed Hegazy

Dr: Ali Al Sayed Abbas

Mr: Abdul Samee Mukhtar Mohamed

Mr: Hassan Al Sayed Moharam

Mr: Ali Ismael Abdul Hameed

Mr: Sameh William Sadek

Counsellor Of Science
Mr : Youssry Fouad Saweris

2018-2019

Links for the first grade preparatory (first term)

CODE	LINK CONTENT	LESSON	UNIT
	Forces among molecules	Matter construction	ONE
	Atom	Atomic structure of matter	
	Energy forms	Energy resources and forms	TWO
	Potential energy and kinetic energy		
	Adaptation	Adaptation and Diversity in living organisms	THREE
	Migration		
	Hibernation		



عزيزى التلميذ/ التلميذة

يسعدنا ونحن نقدم هذا المنهج لأبنائنا تلاميذ الصف الأول الإعدادى أن نؤكد على أن تعلم العلوم متعة وبهجة، متعة فى القيام ببعض الأنشطة العلمية البسيطة، وبهجة فيما يمكن الوصول إليه من نتائج فتعلم العلوم يعتمد على الملاحظة والتفكير والتجربة واستخلاص النتائج

وقد تم اختيار عنوان لهذا المنهج يعكس فلسفته؛ وهو **اكتشف وتعلم** وقد شارك فى إعداد هذا المنهج مجموعة من المتخصصين فى المناهج وطرق تدريس العلوم والخبراء والموجهين والمعلمين، كما تم فيه تجربة الاستعانة بمجموعة من تلاميذ المرحلة المستهدفة تأكيدًا لفلسفة المنهج من حيث مراعاة طبيعة المرحلة العمرية وطبيعة المعرفة والمجتمع

ويهدف هذا الكتاب إلى مساعدة التلميذ على إدراك العلاقة بين العلم والتكنولوجيا ورؤية العلم من منظور شخصى ومجتمعى وفهم تاريخ وطبيعة العلم وتنمية مهارات التفكير العليا وامتلاك المفاهيم العلمية الأساسية ولتحقيق هذه الأهداف تم استخدام أسلوب علمى تقدم فيه المفاهيم فى شكل وحدات دراسية فى ترابط منطقى بعضها مع البعض وتكامل مع المواد الدراسية الأخرى كما أن الموضوعات المتضمنة فى هذا المنهج تتناول المفاهيم الرئيسية فى مجالات المادة وتركيبها، والطاقة، والتنوع والتكيف فى الكائنات الحية، والتفاعلات الكيميائية، والقوى والحركة، والأرض والكون؛ مما يساعد على تشجيع البحث والاستقصاء العلمى

ويتضمن **الفصل الدراسى الأول** ثلاث وحدات لكل منها عنوان يدل على محتواها فقد جاءت **الوحدة الأولى** بعنوان المادة وتركيبها **والوحدة الثانية** بعنوان الطاقة، **والوحدة الثالثة** بعنوان التنوع والتكيف فى الكائنات الحية وتشمل كل وحدة مجموعة دروس مترابطة ومتكاملة

ويعتمد المنهج على إثارة رغبة التلاميذ والتلميذات فى المعرفة والتعلم، والاستفادة من الخبرات المحيطة بهم من كل جانب وذلك من خلال الاعتماد على الأنشطة والتدريبات المتنوعة كما يعتمد المنهج على استراتيجيات التعلم النشط والتعليم المتمركز حول المتعلم فى تنفيذ دروسه؛ ولذلك تم تزويد الدروس بمصادر المعرفة ووسائل التكنولوجيا الحديثة بما يشجع مهارات البحث والتعلم الذاتى وتنمية مهارات التفكير الناقد ويساعد التلميذ على التأمل والتقييم الذاتى فيما يدرسه ويتعلمه، وتكوين ملف الإنجاز الخاص به بما يتفق وفلسفة التقويم الشامل

ونحن إذ نقدم هذا الكتاب نرجو الله أن يحقق الفائدة منه

والله ولى التوفيق

المؤلفون



Contents:

Unit One: Matter and Its Construction

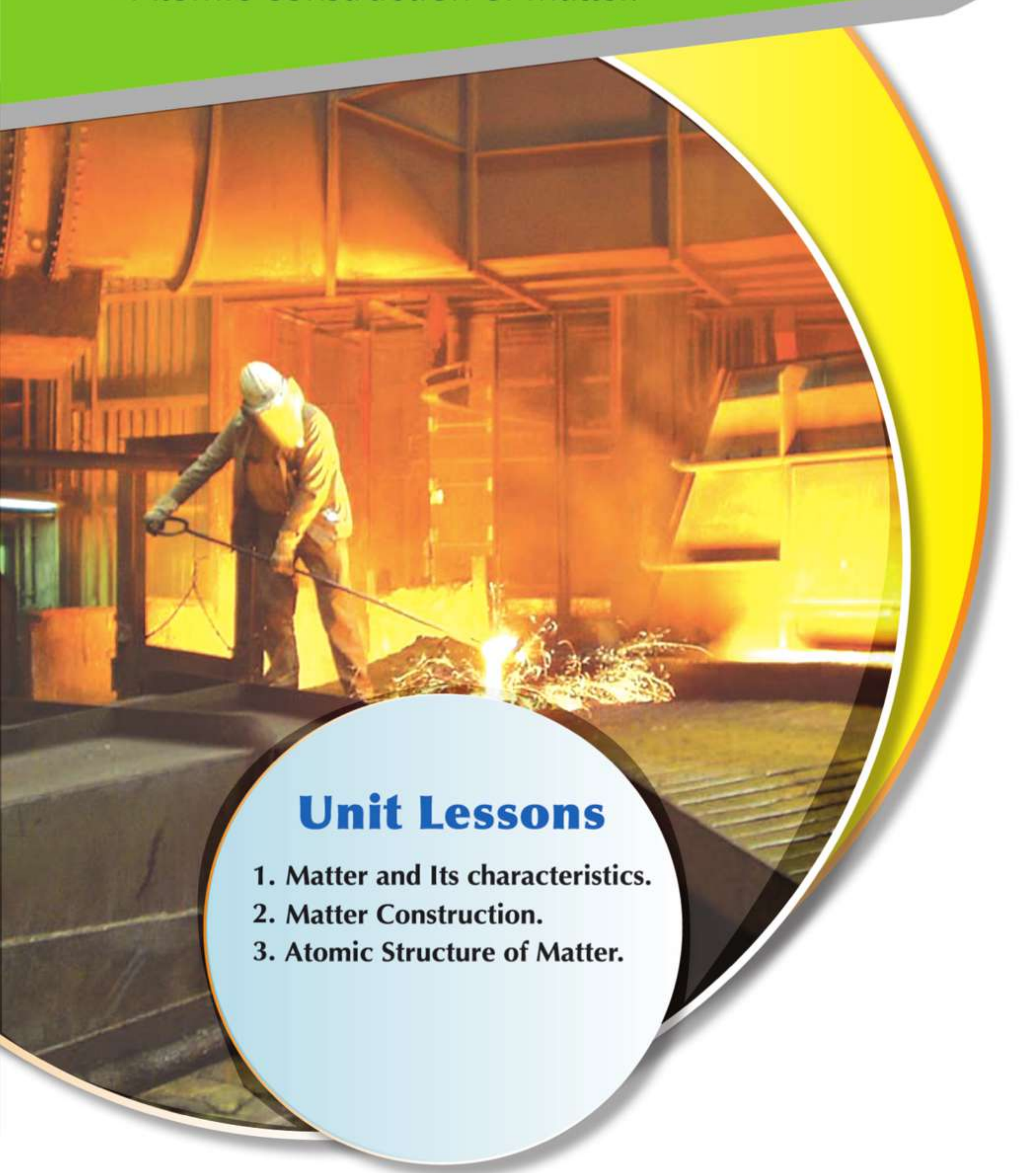
Unit Two: Energy

Unit Three: Diversity and Adaptation in Living Organisms

Unit One

Matter and its Construction

- Matter and its characteristics.
- Atomic construction of matter.



Unit Lessons

1. Matter and Its characteristics.
2. Matter Construction.
3. Atomic Structure of Matter.

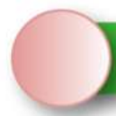
Objectives

By the end of this unit, a student will be able to:

1.– Identify the physical and chemical properties of matter.
2.– Classify a group of materials according to their physical and chemical properties.
3.– Appreciate the importance of senses in identifying the physical properties of matter.
4.– Prove by an activity that mass of matter still constant if it is divided or changed from one state to another.
5.– Identify the concept of the element and the compound.
6.– Compare the molecule of an element to the molecule of a compound according to the atomic structure.
7.– Identify the concept of an atom and its structure.
8.– Design a model for the atom to show its structure.
9.– Conclude the relation between the atomic structure and the chemical properties of the atom.
10.– Design some models for the structure of molecules of some materials.
11.– Identify the electronic configuration in an atom.
12.– Design a model for an electronic configuration of an atom.
13.– Mention the symbols and chemical formula of some materials.
14.– Conclude the fact that an atom is the building unit of all materials.
15.– Appreciate the glory of God in creating a countless number of different materials.
16.– Appreciate the role of scientists and their scientific discoveries in the field of the matter structure.

Lesson One

Matter and Its characteristics



Lesson Items

1. Physical properties of matter.
2. Metals and chemical activity.



Lesson Objectives

By the end of this lesson, a student will be able to:

- Explain the concept of density.
- Conclude that materials of densities lighter than water density float over water surface.
- Determine a liquid density.
- Illustrate life applications of density.
- Explain points of melting and boiling.
- Give examples for conductors and non conductors of electricity.
- Give examples for conductors and non conductors of heat.
- Compare solidification among different materials.
- Understand money loss from the rusting process.
- Explain methods of metal protection against metal corrosion.



Life Issues

- Economize consumption of resources.



Matter and its characteristics

Matter is surrounding us everywhere. It is everything that has mass and volume (occupies space.)

Attention
- Some substances may harm you when testing them by either taste or smell. Ask your teacher first.

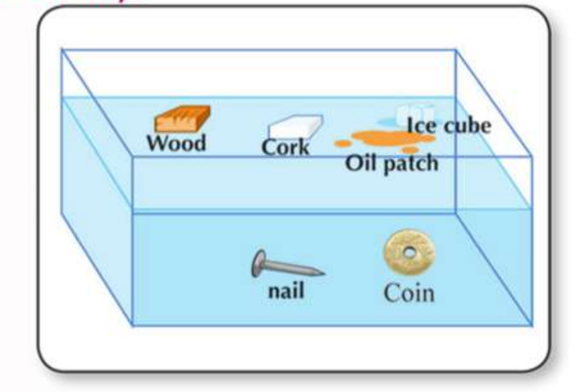
A substance may differ than another in its colour, its taste, its smell or even in all of these characteristics. For example, colour enables us distinguishing among iron, gold and silver. Also the taste enables us distinguishing between sugar and table salt, and at last, smell enables us distinguishing between perfume and vinegar.

There are also some other substances have no colour, no smell or no taste. Such as water and oxygen gas. These substances can be distinguished from each other by other different characteristics.

Activity 1 (Matter and Density)

Put the following substances in a bowl filled with water as shown:

A Coin ,an iron nail , 
an ice cube, a piece of wood, a piece of cork and drops of food oil. Record your observations.



- What do you observe: ....
- Conclusion: ....

Substances of densities less than the water density, float on water surface, while other substances of densities more than that of water sink.

- Equal masses of different substances have different volumes ,also equal volumes of different substances have different masses. This is because of their different densities.

Density: it is the mass of unit volume of a substance (mass of one cubic centimeter 1 cm^3).

So density is related to the object mass and to its volume as well:

$$\text{Density } (g/cm^3) = \frac{\text{Mass (g)}}{\text{Volume } (cm^3)}$$

Example: on finding a liquid density through an experiment, the following results were recorded:

Mass of an empty glass beaker = 75 g

Mass of the beaker containing liquid = 135 g

Volume of the liquid measured by a graduated cylinder = 100 cm^3

So we can calculate the liquid density as follows:

Mass of liquid = 135 - 75 = 60 g.

$$\text{Liquid Density} = \frac{\text{Mass}}{\text{Volume}}$$

Liquid Density = 60 ÷ 100 = 0.6 g/cm^3



The following table records values of masses and volumes of some substances.

- Arrange the substances according to density descendingly:

Substance	Mass (g)	Volume cm^3	Density (g/cm^3)
Water	50	50	
Iron	31.2	4	
Petrol oil	82	100	
red copper	22.25	2.5	
cork	5	25	

- Densities in descending order: ....,......................,......................,.............



Life Applications

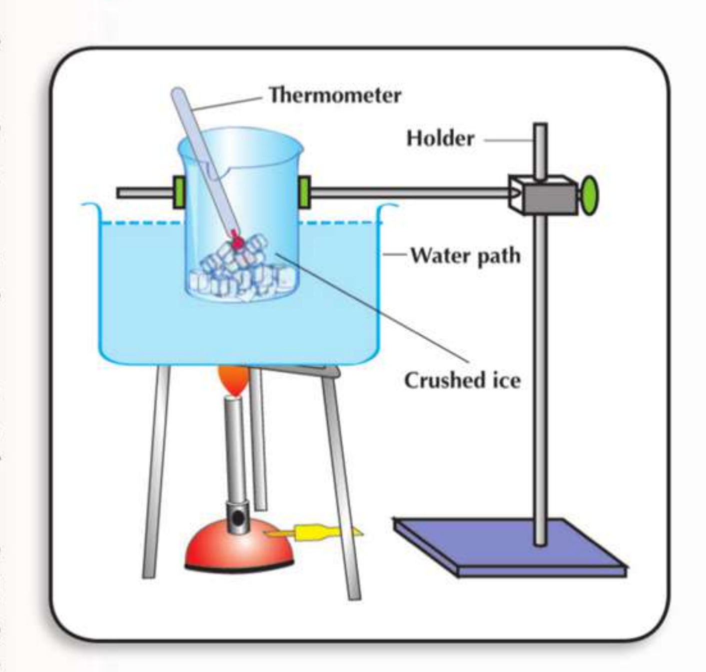
1. Water is not used in extinguishing petrol fires because petroleum oil floats over water surface .

2. Balloons filled with hydrogen or helium rise upwards carrying flags during festivals since their densities are lighter than that of air..



Knowing the density of natural milk is 1.03 g/cm^3. How can you identify the quality of milk you bought from a milk vendor?

Activity 2 Matter and point of fusion



- In the opposite figure there is a water bath.
- Put some crushed ice in the internal beaker, and a thermometer.
- Place the water bath on a flame and wait some time.
- When ice begins to melt, place the flame away, record the thermometer reading.
- Repeat the procedure using solid wax instead of ice, then record the thermometer reading when wax begins to melt. Is the melting point of wax the same as that of ice?

- What do you observe? ....
- Conclusion: ....



Melting point: it is the temperature at which matter begins to change from a solid state into a liquid one.

Melting points of substances differ from each other, some have low melting points like butter, ice and wax, others have higher melting points like iron, aluminum, copper and table salt.

Life Applications

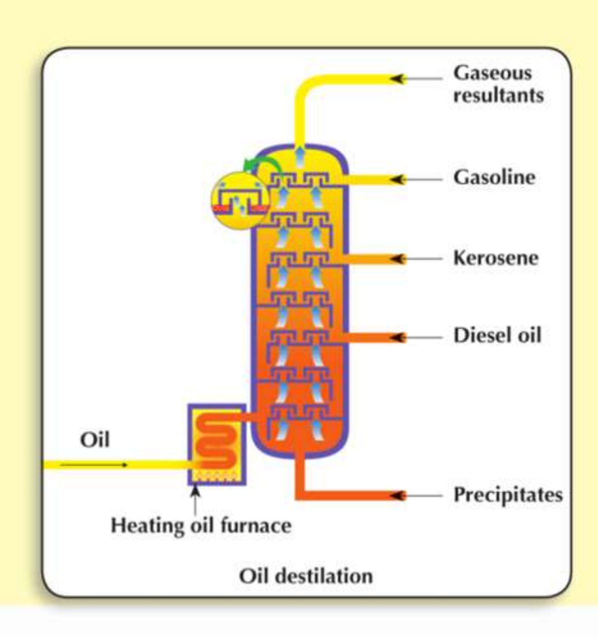
1. Manufacturers heat metals to be molten, so that they could be easily shaped or even mixed to form alloys Like gold copper alloy used in making jewels, or nickel chrome alloy which is used in making heating coils.
2. Cooking pots are made up of aluminum or stainless steel alloy which does not rust, due to its high melting point .

- Also each substance has its own boiling point which identifies this substance and distinguishes it from other substances.

Boiling point: it is the temperature at which a substance begins to change from a liquid state into a gaseous state.

Enrichment information

- Scientists depend on the various boiling points of substances to separate the petrol components by heating the oil to separate each substance at its boiling point.
- The boiling point is the temperature at which the vapour pressure of the substance equals the atmospheric pressure so the boiling point of a liquid increases by the increase of the pressure exerted on.
- Pressure cooking pots are used to save time taken to cook food. Because these pots cause the increase of pressure, so the boiling point increases.



Oil destilation



There are other characteristics of which other substances are different such as hardness, electric conduction and thermal conduction:

Hardness:

- Some solids are soft at ordinary temperatures such as rubber.
- Some substances need heat to get soften in order to be easily shaped such as metals.
- Some other substances are solids which can not be soften if heated such as coal and sulphur.

Electric conduction:

- Some substances are good electric conductors such as metals (copper and silver) also acid and alkali solutions and some salts solutions.
- Some other substances do not conduct electricity such as gases, sugar solution, or solution of hydrogen chloride in benzene. In addition to some other solid elements such as sulphur and phosphorus.

Thermal conduction:

Substances differ in their abilities of heat conduction.. Some are poor thermal conductors like wood and plastics. Other substances are good heat conductors like metals (iron – copper – aluminum ….).

Life Applications

1. Electric cables are made up of copper or aluminum.
2. Cooking pots are made up of aluminum.
3. Cooking pots have handles made up of wood or plastic.
4. The handles of screw drivers are made up of plastics or wood while the rest of the screw drivers are made of steel iron.

Metals and chemical activity:

Why do metals lose their luster when they are exposed to air for a period of time?

Some elements are very active as potassium and sodium which react with oxygen as soon as being exposed to humid air. Other substances like iron, aluminum and copper react with oxygen if left in air for some days since they have less chemical activity.

Some other substances find great difficulty to react with oxygen like silver, platinum and gold since they are not active; so these substances are used in making jewels. Also substances, like gold and silver, which are chemically poor active are used to cover other substances which rapidly gain rust, as iron to protect them from rust and corrosion.

Life Applications

1. Painting metallic bridges and the light posts in streets from time to time in order to protect them against rust.
2. Spare parts of cars are coated with grease to protect them getting rust.
3. Cooking aluminum pots are washed using a rough material to remove any layer formed on the pot surface.

Optional Activities:

Choose one of the following activities, share a group of classmates to perform, then ask your teacher to evaluate.

1. Write a list of some substances then compare their characteristics.
2. Write a report about life applications of some substances
3. Write a scientific essay about the negative impact of iron rust which causes economic loss and how to overcome.?



Summary



- Density: mass of unit volume of a substance
- Melting point: it is the temperature at which a substance changes from a solid state into a liquid one.
- Boiling point: it is the temperature at which a substance changes from a liquid state into gaseous one.
- Substances differ in their characteristics as: colour, taste, smell, density, melting and boiling points, hardness, thermal conduction, and electric conduction.
- Substances have different chemical activities.





Exercises

Question 1:

Complete the following:

1. Unit of volume is............ and that of mass is ....
2. Density is the .... of unit volume of the substance and its unit is ....
3. An alloy of .... is used in making jewels while an alloy of .... is used in making heaters coils.
4. Light posts in streets are painted from time to time in order to protect from ....
5. Substances conduct heat and electricity are like .... and .... while substances which do not conduct neither heat nor electricity are like .... and ....

Question 2:

Explain the following observations:

1. Wood piece floats in water surface while a piece of lead sinks.
2. Iron rods, not copper, are used in building houses concrete.
3. Ice cube changes into a liquid water after a period of time.
4. Electrician uses a screw driver made up of steel iron with a woody handle.

Question 3:

A. On determining iron density using a piece of iron of mass 78 g. The piece is immersed in 100 cm^3 of water, the water level rises up to 110 cm^3 .Calculate iron density.

B. **What is meant by:**
Melting point – Boiling point.

Question 4:

A. **Select the best answer:**

1. The colour property is a distinguishing factor between:
   (Flour and table salt – iron and gold – oxygen and carbon dioxide).
2. The smell property is a distinguishing factor between:
   (Iron and copper – wood and plastic – perfume and vinegar).
3. The taste property is a distinguishing factor between:
   (Milk and honey – wood and plastic – silver and gold).
4. The property of electric conduction is a distinguishing factor between:
   (Iron and copper – wood and plastic – iron and wood).

B. One of your classmates has bought a medal of silver, he thought it was fake. How can you help him to verify this thought?





Self reflection and self evaluation

Dear student, as you finish the study of matter and its characteristics try to fill in this card:

A. What are the issues you like in the lesson?

....

B. What are the issues you dislike in the lesson?

....

C. What are the errors you have done on doing the experiments and performing activities?

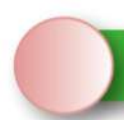
....

D. What are the errors can be avoided in the next activities?

....

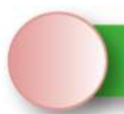
Matter Construction





Lesson Items

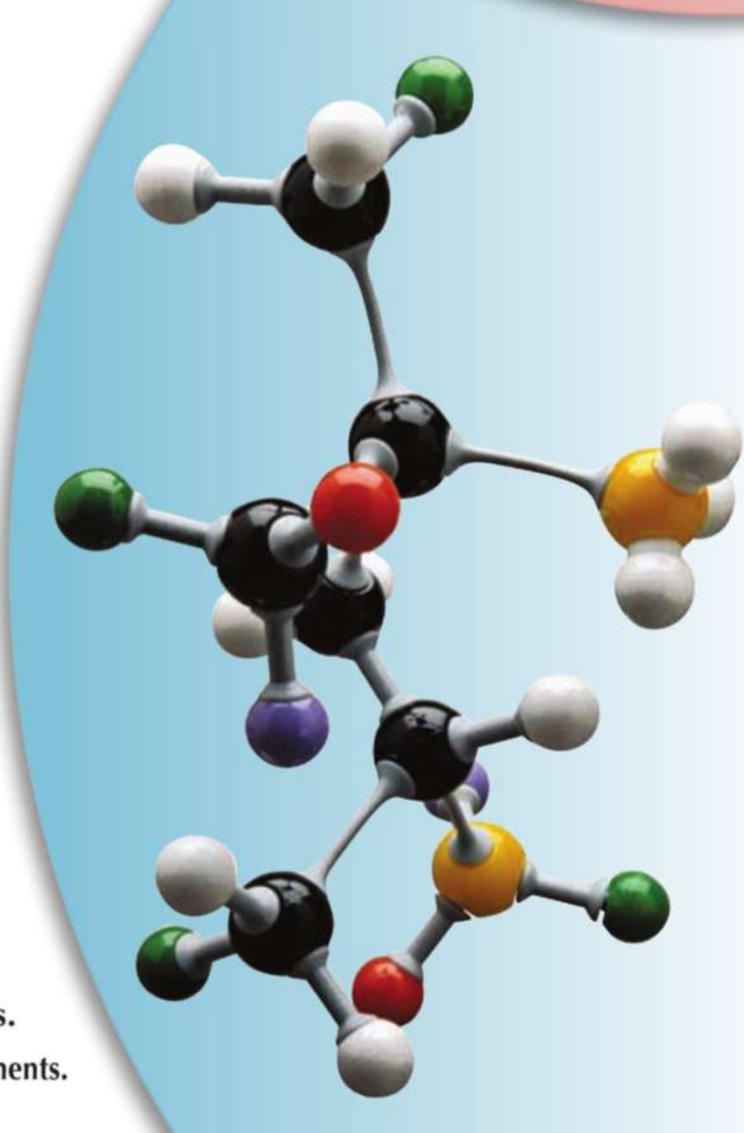
1. The molecule.
2. Molecule structure.

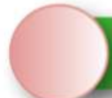


Lesson Objectives

By the end of this lesson, a student will be able to:

- Identify the building unit of matter.
- Prove by experiment that molecules of matter are in contineous motion.
- Indicate by experiment that there are intermolecular spaces between molecules.
- Compare between the three states of matter according to the attraction forces among molecules.
- Explain the relation between the temperature and the attraction forces among molecules.
- Define the meaning of an element and a compound.
- Give some examples of elements and compounds as well.
- Design preliminary models for elements and compounds molecules.
- Show the economic benefits of some elements.





Life Issues

- Investing resources.



The living organism consists of a group of organs and each organ is composed of a number of cells ...thus the cell is the structural unit of the living organism. The matter is formed of very small structural units known as molecules.

What is a molecule? ....

Activity 1 (Matter is composed of molecules)

1. Put some perfume in a glass bottle and measure its mass, using a sensitive balance.
2. Open the bottle for a period of time, then take it to another side of the classroom.

- What do you observe? ....
- Conclusion: ....

3. Measure the mass of the bottle again.

- What do you observe? ....
- Conclusion: ....

The perfume particles are divided into tiny particles that can not be seen via naked eye nor even by a microscope, these particles are spread and carried through the air in the room having the perfume properties. These particles are called molecules.

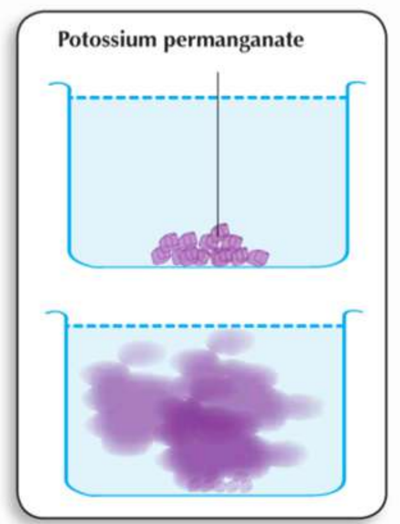
Molecule: is the smallest particle of matter that can exist freely and it has its own matter properties.

Try these activities to identify the properties of molecules in a substance:

Activity 2 Motion of molecules

1. Put a small amount of potassium permanganate in a glass beaker containing water.
2. Leave the beaker a period of time.

- What do you observe? ....
- Conclusion: ....

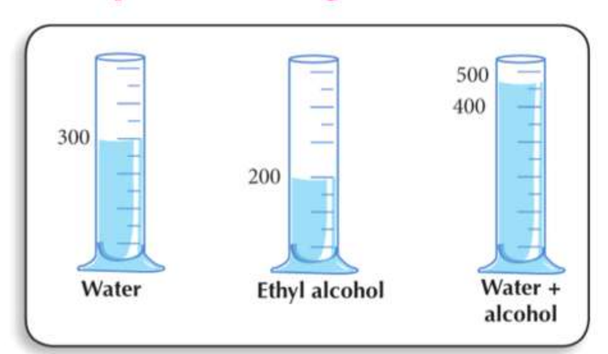


Permanganate salt dissociates into particles that spread in the water gradually in all directions until all the water is coloured in violet, and this proves that permanganate particles are in continuous motion allowing them to spread among water molecules. Additionaly, observe the perfume molecules spread in the previous mentioned activity.

Matter molecules are in a continuous motion.

Activity 3 (Intermolecular spaces among molecules)

Add 200 cm^3 from ethyl alcohol to 300 cm^3 of water in a measuring cylinder, then measure their volume.



- What do you observe? ....
- Conclusion: ....

The volume of the mixture is less than 500 cm^3, this means that some of alcohol molecules are distributed in the intermolecular spaces found among water molecules. This proves that there are intermolecular spaces between molecules.

Intermolecular spaces are found among matter molecules.

Activity 4 (Forces of attraction among molecules)

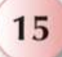
1. Try to fragmentize a piece of iron with your fingers or by hammering it.
2. Try to divide an amount of water on small cups.

- What do you observe? ....
- Conclusion: ....

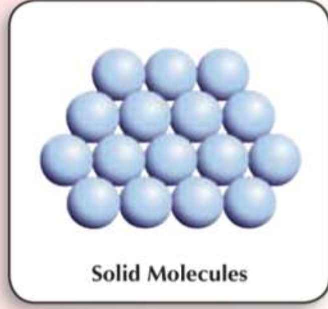
Attraction forces are found among matter molecules.

The attraction forces among molecules are very strong in solids such as iron and aluminum, but these forces are weak in a liquid state substance like water, alcohol and oil. It is almost not found in gaseous substance such as oxygen, water vapour and carbon dioxide.





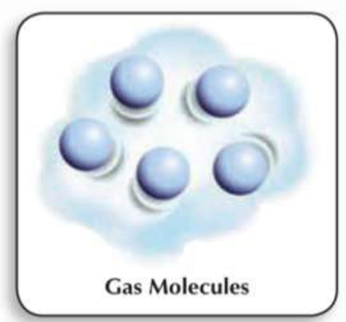




Solid Molecules



Liquid Molecules



Gas Molecules

For th s, solid matter keeps its shape and volume whatever the container shape changes, while the liquid takes the shape of container, but gases have no definite shape. Their molecules spread in all available spaces.

From the previous, we can summarize molecules properties as follow:

1. Matter molecules are in continuous motion, limited in solids, more free in liquids and completely free in gases.
2. Intermolecular spaces are found among molecules which are tiny in solids, little big in liquids and very large in gases.
3. Attraction forces among molecules are very strong among solids, weak in liquids and almost not existed in gases.

When a solid substance is heated, molecules gain thermal energy which increases the intermolecular spaces and causes a weakness of the intermolecular forces among its molecules, then become more freely to change into a liquid, this process is known as melting.

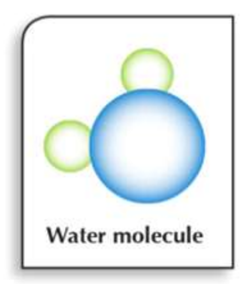
By continuous heating to the liquid substance, its molecules gain more energy increasing the speed of its motion, moving in large distances and more freely to change into a gaseous state, that spread in all places or the container and this process is known as vaporization.



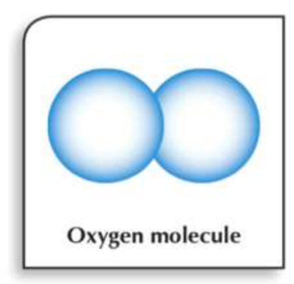
- At the point the substance change from solid state to liquid state' the temperature remains constant until all of the substance change completely into liquid state, although the continually of heating. The extra heat used during the melting process, is known as the latent heat for melting. Further more in vaporization process the heat used for that is known as the latent heat for vaporization at which the temperature remains constant.

Matter and Molecules:

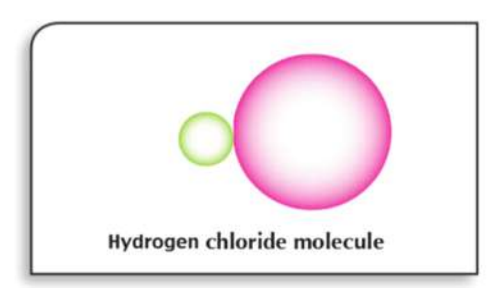
The molecules of one substance are alike in properties, but they differ than other substance molecules.



Water molecule



Oxygen molecule



Hydrogen chloride molecule

The difference in molecules of various substances is found as a result of the difference in molecular structures.

The molecules are composed of tiny structural units, each of them is known as the atom The reason which causes molecules of certain substance differ than molecules of another substance: is the number and the kind of atoms involved in the structure of the molecule and the way they combine together.

A substance whose molecule is composed only of one kind of atoms, whatever its number is known as an element.

But a substance whose molecule is composed of different atoms is known as a compound.

Element: is the simplest pure form of a substance, we couldn't decompose it chemically into a simpler substance.

Compound: is the product of a combination of two atoms or more of different elements with constant weight ratios.

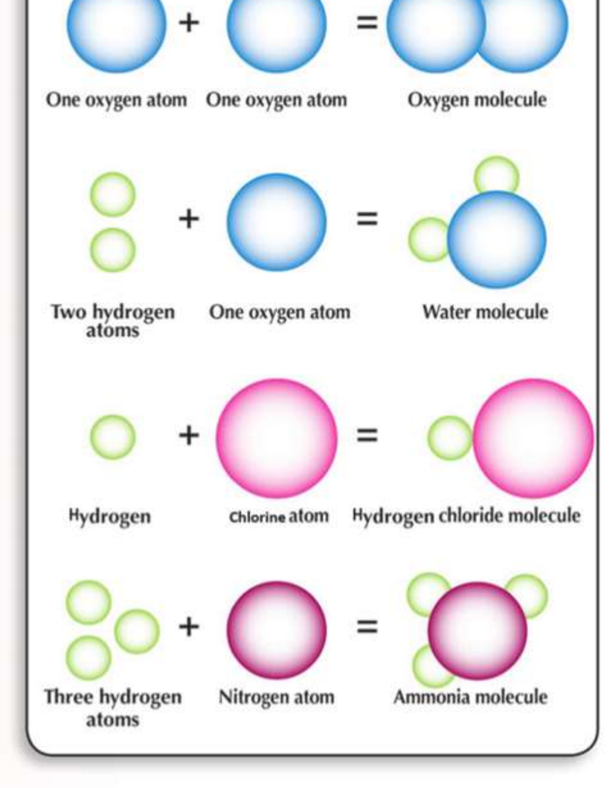




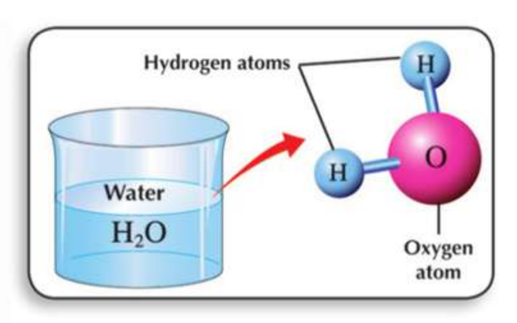


Exercise

Figures In this table illustrate the reaction of atoms in order to produce molecules of different substances:



1. Determine the number of atoms from which every molecule is formed, illustrate if they are similar or not.
2. Show which of these molecules represent an element molecule and which represent a compound one.
   - There are molecules of gaseous elements composed of two identical atoms such as hydrogen, nitrogen, chlorine, fluorine and oxygen.
   - Molecules of gaseous elements are composed of one atom as in the inert gases (noble gases): helium, neon, argon, krypton, xenon, and radon.
   - Molecules for liquid elements such as bromine (two atoms), mercury (one atom)



- Compounds molecules have different number of different atoms.

It is noticeable that one water molecule is composed of three atoms: two hydrogen atoms and one oxygen

atom, although the small water drop contains millions of these molecules which can not be seen by naked eye or even by a microscope.

This means that molecules of any substance are very tiny.

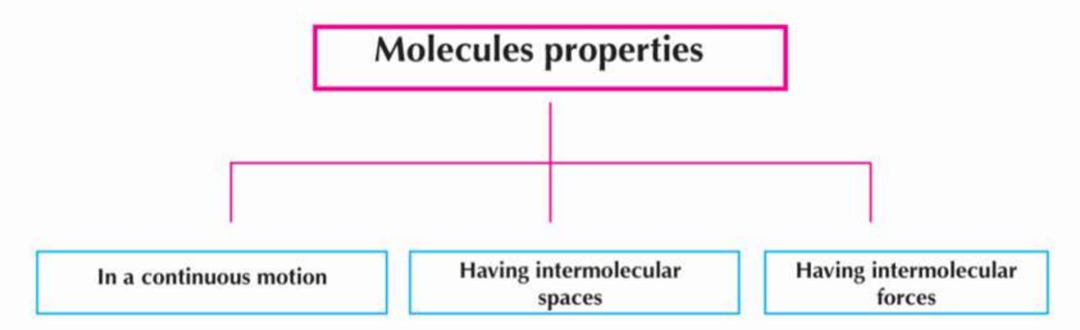
Optional Activities:

Choose one of these activities to do with a group of your classmates.

- Use the following materials in making models of some molecules of elements and other molecules of compounds: clay – matches – scissros – ruler – compass - pencil - drawing paper.
- Write a short paragraph on substance recycling.



- The molecule: is the smallest part of matter that can exist freely having the properties of a substance.
- The element: is the simplest pure form of matter and can not be analyzed into simpler form.
- The compound: is the result of combination between two or more atoms of different elements with constant ratio of mass.





Exercises

Question 1:

Explain a practical experiment to illustrate:

1. Substance is composed of small tiny molecules.
2. Substance molecules are in a continuous motion.
3. There are intermolecular spaces between molecules.

Question 2:

Give reasons for the following:

1. When adding an amount of table salt to water it disappears after a time.
2. The volume of a mixture of water with alcohol is less than the sum of their volumes before being mixed together.
3. It is very hard to fragmentize a piece of iron with your fingers.
4. It is easy to divide an amount of water into small droplets.
5. The solid substances keep their shape whatever the container shape differs, while the liquid takes the shape of its container.
6. When you leave the perfume bottle opened you smell it all over the room.

Question 3:

Write the scientific term for each of the following sentences:

1. The simplest pure form for a substance, that could not be analyzed into simpler form.
2. The smallest part of matter that can exist freely and matter properties appear in.
3. The product resulted form combination of atoms of different elements with constant ratio of mass.
4. The spaces that found among the molecules.

Question 4:

Put (✓) or (✕) in front of the following sentences:

1. Molecules of the same substance are different from each other.
2. The attraction forces among molecules of solids are very small.
3. The distance among solid molecules are very small.
4. The motion of gaseous molecules are limited.
5. The molecules of solid substances vibrate in a simple vibratory motion.
6. The compound consists of a combination of atoms of one element.

Question 5:

Compare among solid, liquid and gas regarding to:

1. The distance among molecules.
2. The intermolecular forces among molecules.

Question 6:

A. **Complete the following:**

1. The liquid element whose molecule is composed of one atom is .... while that composed of two atoms is ....
2. The matter is composed of small units called .... while these units are composed of smaller units called ....
3. The .... takes the shape of the container but, ... has no definite shape.
4. The hydrogen molecule consists of .... while the argon molecule (inert gas) consists of ....

B. One of your relatives asked you why I smell your perfume although I am far from you, what is your explanation?



Self reflection and self evaluation

Dear students after studying matter construction fill in this card:

A. What are the items you like in the lesson?

....

B. What are the items you dislike in the lesson?

....

C. What are the errors you have done on performing the experiments and activities?

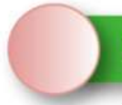
....

D. What are the errors can be avoided in the next activities?

....

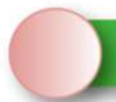
Lesson Three

Atomic Structure of Matter



Lesson Items

1. Atomic structure.
2. Electronic configuration and chemical reactions.



Lesson Objectives

By the end of this lesson, a student will be able to:

- Mention the chemical symbols of the elements.
- Explain the atomic structure.
- Explain the atomic number and mass number.
- Calculate the number of the particles found in the atom by knowing both mass and atomic numbers.
- Identify the energy levels in the atom.
- Determine the rules of electronic configuration.
- Deduce the electronic configuration by knowing the atomic number.
- Deduce the relation between the electronic configuration and chemical activity.
- Design a preliminary model of atom construction.
- Write a short brief about scientists who had studied the atomic construction.
- Appreciate the role of scientists who hau discovered the atom.
- Share some classmates to make a model of atom with its electronic configuration.





Life Issues

- Applying nuclear energy in peace.



Chemical symbols of elements

Matter is composed of molecules. Molecules are composed of smaller particles called atoms.

Chemists use symbols which easily express the elements. The following table includes the symbols of some of the most famous used atoms of elements.

Element	Atom symbol	Element	Atom symbol
Lithium	Li	Hydrogen	H
Potassium	K	Oxygen	O
Sodium	Na	Nitrogen	N
Calcium	Ca	Fluorine	F
Magnesium	Mg	Chlorine	Cl
Aluminum	Al	Bromine	Br
Zinc	Zn	Iodine	I
Iron	Fe	Helium	He
Lead	Pb	Argon	Ar
Copper	Cu	Sulphur	S
Mercury	Hg	Phosphorous	P
Silver	Ag	Carbon	C
Gold	Au	Silicon	Si

From the table above, we find:

1. The symbol represents one individual atom.
2. If the element symbol was one letter it is written in capital.

3. Some elements have more than two letters as a symbol, that because the first letter was common in these elements such as Calcium and Carbon. So we have the carbon symbol C while the calcium symbol Ca, the first letter is written in capital and the second in small.
4. Some elements are not derived from English names of the elements and so they have symbols taken from Latin language which are of different letters.

Example:

Element in English	Element in Latin	Element Symbol
Sodium	Natrium	Na
Potassium	Kalium	K

Atomic construction:

The scientists operated many experiments to reach the final idea about the atomic construction of nucleus and electrons:

A. Nucleus:

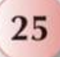
It is the central core of the atom where its mass and positive charges are concentrated; the nucleus contains.

1. Positive charged particles known as (+) protons.
2. Neutral particles known as (±) neutrons.

To express an atom of any element we use two terms:

Atomic number: it is the number of the positive charged particles (protons) and it is written to the left side below the symbol of the element.





Mass number: is the sum of protons and neutrons number found in the nucleus, it is written above the symbol.

Example: oxygen has atomic number 8 and a mass number of 16, it is written $^{16}_{8}O$.

This means that its nucleus contains 8 positive protons and the total number of protons and neutrons = 16, so the number of neutrons in the nucleus can be found from the equation:

Mass number = number of protons + number of neutrons

16 = 8 + number of neutrons

Number of neutrons = 16 – 8 = 8 neutrons.

Complete the following table:

Element symbol	Atomic number	Mass number	Number of protons	Number of neutrons
$^{1}_{1}H$				
$^{40}_{20}Ca$				
$^{24}_{12}Mg$				
$^{12}_{6}C$				
$^{35}_{17}Cl$				
$^{23}_{11}Na$				

The number of protons may equal the number of neutrons, or the number of neutrons may exceed the protons number and this increases the mass of the atom. If the protons number changes the positive charge of the nucleus changes and also both atomic and mass numbers change and so the atom becames of another element.

B. Electrons:

They are negatively charged particles of negligible mass.

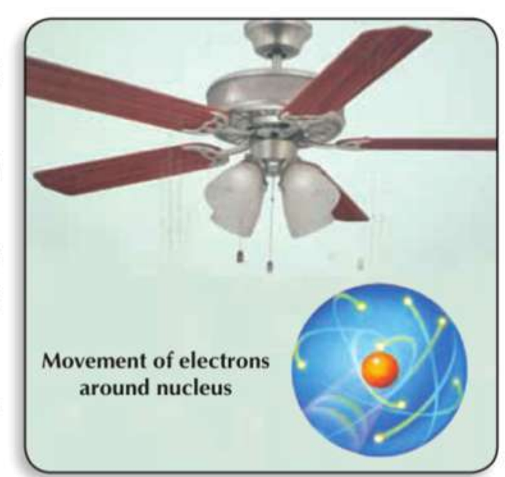
- The electrons revolve around the nucleus at a very high speed.

 Activity 1 **(Revolving of electrons around the nucleus)**

1. Look at an electric fan, at rest.
2. Can you distinguish the blades of the fan?
3. Turn it on. Can you distinguish any of the blades?

Imagine the revolving of the electrons as the rotation of the fan blades. What figure do you expect?

- Conclusion: ....

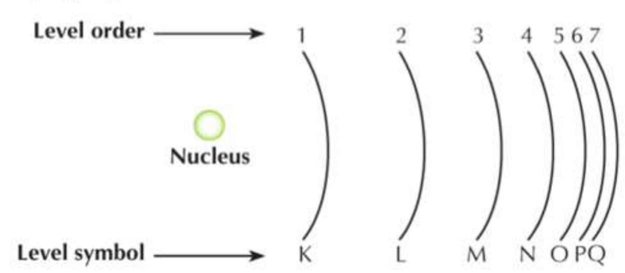


The electrons revolve around the nucleus in orbits known as energy levels.

Energy levels: are imaginary places around the nucleus in which the electrons move according to their energy.

- The number of energy levels in the largest known atom is 7 levels represented from inner to outer levels by letters:

K, L, M, N, O, P, Q.









- Each level has a certain amount of energy that increases by the increase of the level distance from nucleus, this means that energy of level L is greater than that of level K.
- Each level has a certain number of electrons which can revolve in, for example:

  1st level K: is saturated by 2 electrons.
  2nd level L: is saturated by 8 electrons.
  3rd level M: is saturated by 18 electrons.
  4th level N: is saturated by 32 electrons.
  Any other farther level, is saturated by 32 electrons.
- The number of electrons that saturates the level n = $2n^2$ i.e. it is double the square number of the level order, (n) .

Example:

1st level K level: n = 1.
Number of electrons saturates the level = 2 n^2 where n = 1.
Number of electrons saturates the K level = 2 x 1^2 = 2 electrons.

2nd level L level: n = 2.
Number of electrons saturates the level = 2 n^2 where n =2.
Number of electrons saturates the L level = 2 x 2^2 = 2 x 4 = 8 electrons.

3rd level M level: n = 3.
Number of electrons saturates the level = 2 n^2 where n = 3.
Number of electrons saturates the M level = 2 x 3^2 = 18 electrons.

4th level N level: n = 4.
Number of electrons saturates the level = 2 n^2 where n = 4.
Number of electrons saturates the N level = 2 x 4^2 = 32 electrons.

This equation is not applied to the levels higher than the 4th one other wise the atom will be unstable.

- An electron is not transferred from one level to a higher one unless it gains some energy equal to the difference between the energy of the two levels, which is known as QUANTUM. The atom will be in excited state. If the atom loses this energy, it returns to its original state which is known as the ground state.

Quantum: It is the amount of energy gained or lost by the electron to transfer from an energy level to another.

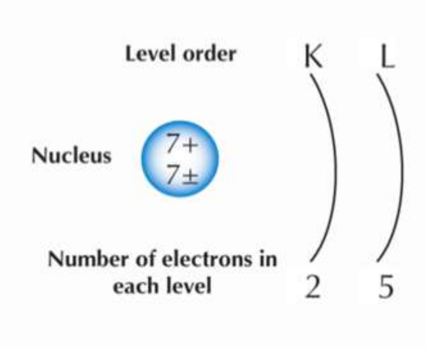
- Number of negative electrons = the number of the positive protons in the nucleus, hence the atom is electrically neutral.
- The outer most energy level is saturated with 8 electrons whatever the level order is (except the K level is saturated with 2 electrons only).

Electronic configuration:

The atomic number of nitrogen atom is 7, so the number of protons = 7, The number of electrons rotating around the nucleus = 7 as well.

The electronic configuration is:

2 electrons in K level, and 5 electrons in L level.



Also the energy of the level K is less than that of the L level. Electrons are distributed in the 1st level then the second and so on.

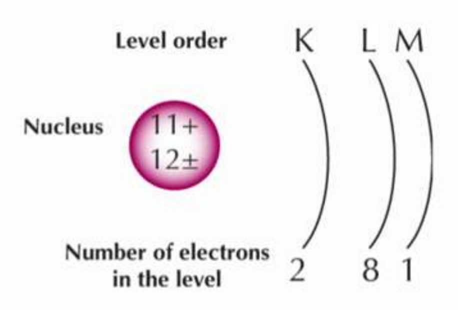
The atomic number of sodium atom is 11, so there are 11 electrons in the atom which are distributed as:

2 electrons in K level,

8 electrons in L level

1 electron in M level

The total = 11 electrons



The configuration is expressed as in the figure.



Exercise

Write the electronic configuration of the following atoms, illustrating the number of electrons in the outer level of each atom , also show the number of the energy levels.

$$^{27}_{13}Al \; - \; ^{24}_{12}Mg \; - \; ^{35}_{17}Cl \; - \; ^{7}_{3}Li \; - \; ^{16}_{8}O \; - \; ^{1}_{1}H$$

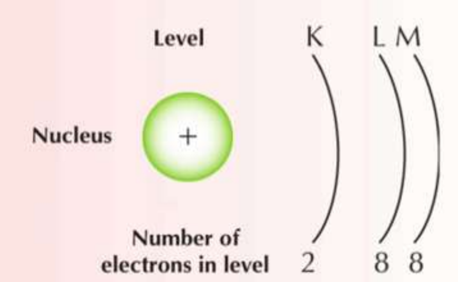
The electronic configuration and the chemical activity:

The atom is active and not stable as far as the number of the electrons in the outer level is less than 8 electrons.

This means that the chemical activity is related to the number of electrons in the outer level. If the number of electrons in the outer level of an atom is less than 8 electrons, this atom reacts chemically with another atom or more to produce a molecule in a stable state.

There are some atoms like those of the inert gases that do not react chemically with other elements.

For example Argon Ar. Its $_{18}$ electronic configuration is as follows:



The atom: is the smallest individual unit of matter which can share in a chemical reaction.



- The following are scientists who contributed the discovery of the atom construction: Greek scientists – Boyle – Dalton – Thomson – Rutherford –Bohr.
- The atom diameter is measured in Angstrom which equals one part of ten thousands million parts of one metre – for example the radius of hydrogen atom = 0.3 Angstrom, this indicates how much the atom is small.

Optional Activities:

Choose one of the following activities and try it with some of your classmates, ask your teacher to evaluate.

- Materials:

(Coloured papers – number of small spherical objects – copper wire – glue – drawing board – clay).

1. Make a model of oxygen atom $^{16}_{8}O$
2. Show the electronic configuration of sodium atom $^{23}_{11}Na$
3. Write a wall chart to illustrate the development of scientists thinking about atom construction.



Summary



- Atom: is the smallest individual unit of matter which can share in a chemical reaction.
  1. Nucleus: contains:
     a. Protons which are positively charged.
     b. Neutrons which are electrically neutral.
  2. Electrons of negative charges revolving around the nucleus at very high speed in energy levels of symbols K, L, M, N, O, P, Q.
- The atom is electrically neutral because the number of positive protons is equal to the number of negative electrons.
- The atomic number: is the number of positive Protons in the nucleus and is written to the left below the element symbol.
- Mass number: is the sum of the number of protons and the number of neutrons in the nucleus of the atom and it is written above the symbol.
- Mass number = number of protons + number of neutrons.
- Each energy level carries a number of electrons, and the number that saturates the level of order n = $2n^2$.
- Each level contains an amount of energy which increases by the increase of the distance between the nucleus and this level.
- The quantum: it is amount of energy needed or lost to transfer an electron from an energy level to another.







Exercises

Question 1:

A. **Write the symbols of the following elements:**

Sodium – Potassium – Chlorine – Nitrogen – Calcium – Aluminum – Phosphorous.

B. **Write the electronic configuration of the following atoms:**

$$^{23}_{11}Na - {}^{35}_{17}Cl - {}^{24}_{12}Mg - {}^{4}_{2}He - {}^{7}_{3}Li$$

1. Indicate the number of electrons in the outer level of each atom.
2. Calculate the number of neutrons in each atom.

Question 2:

Give reasons for:

1. The atom is electrically neutral.
2. The mass number is greater than the atomic number.
3. The 3rd energy level (M) in the atom contains 18 electrons.
4. The equation $2\ n^2$ is not applied to levels higher than the 4th level.
5. Neon atom $_{10}Ne$ does not enter in a chemical reaction through the ordinary conditions.
6. The electrons are distributed to fill the K level before filling the L level.

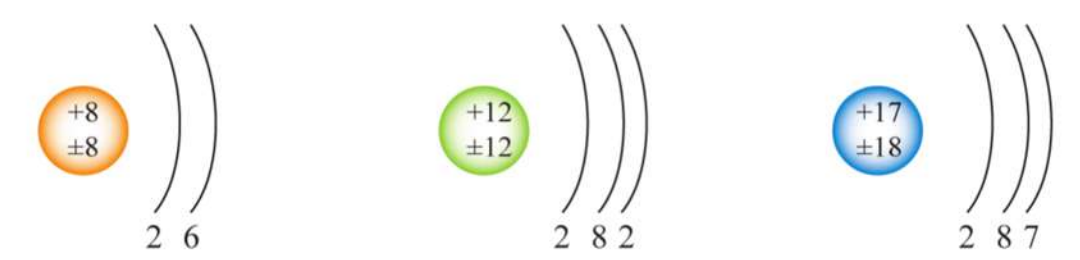
Question 3:

Write the scientific term which relates to the following statements:

1. The smallest unit of matter construction which share in the chemical reactions.
2. Number of the positive protons in the atom nucleus.
3. Sum of protons and neutrons in a nucleus.
4. Energy needed or lost to transfer an electron from an energy level to another.
5. Particles which are negatively charged and negligible mass that revolve around the nucleus.

Question 4:

A. **The figures shown represent the electronic configuration of the atoms of some elements:**



Study these figures well then determine each of the following:

1. Atomic number of each atom.
2. Mass number of each atom.
3. Number of electrons in the outer level.
4. Number of energy levels having electrons.

B. One of your classmates asked you to explain why magnesium $^{24}_{12}Mg$ and sodium $^{23}_{11}Na$ atoms are different in both atomic and mass numbers. How do you explain this difference?



Self reflection and self evaluation

Dear students after studying atomic structure of matter fill in this card:

A. What are the items you like in the lesson?

....

B. What are the items you dislike in the lesson?

....

C. What are the errors you have done on performing the experiments and activities?

....

D. What are the errors can be avoided in the next activities?

....



Unit 1: General Exercises

Question 1:

A. **Choose a phrase from column (A) which may mach another from column (B):**

A	B
1. Density measuring unit	Atomic number
2. Number of positive protons in nucleus	cm^3
3. Substances that can conduct heat and electricity	Mass number
4. Mass measuring unit	Copper and iron
5. Total number of protons and neutrons	g
6. Bad conductors of heat and electricity	g/cm^3
7. Volume measuring unit	Wood and plastic

B. **Write down the scientific term expresses the following statements:**

1. Smallest particle of matter which can freely exist and has the characteristics of its substance.
2. Temperature at which a solid substance starts to change into a liquid.
3. the smallest particle that can share in chemical reactions.
4. Imaginary places in which electrons can move according to their energy.
5. The simplest form of matter which can not be decomposed into a simpler one.



Question 2:

Give reasons for:

1. It is difficult to bend an iron rod.
2. The third energy level in the atom is saturated by 18 electrons.
3. Some table salt disappears after a while when added to water without stirring.
4. Atom is electrically neutral.
5. Substances have different chemical properties.
6. Inert gases can not share in chemical reactions in ordinary conditions.

Question 3:

A. **Write down the electron configuration of the following atoms:**

$$^{27}_{13}Al \; - \; ^{20}_{10}Ne \; - \; ^{7}_{3}Li \; - \; ^{32}_{16}S$$

Then determine each of:

atomic number – number of neutrons – mass number – number of electrons.

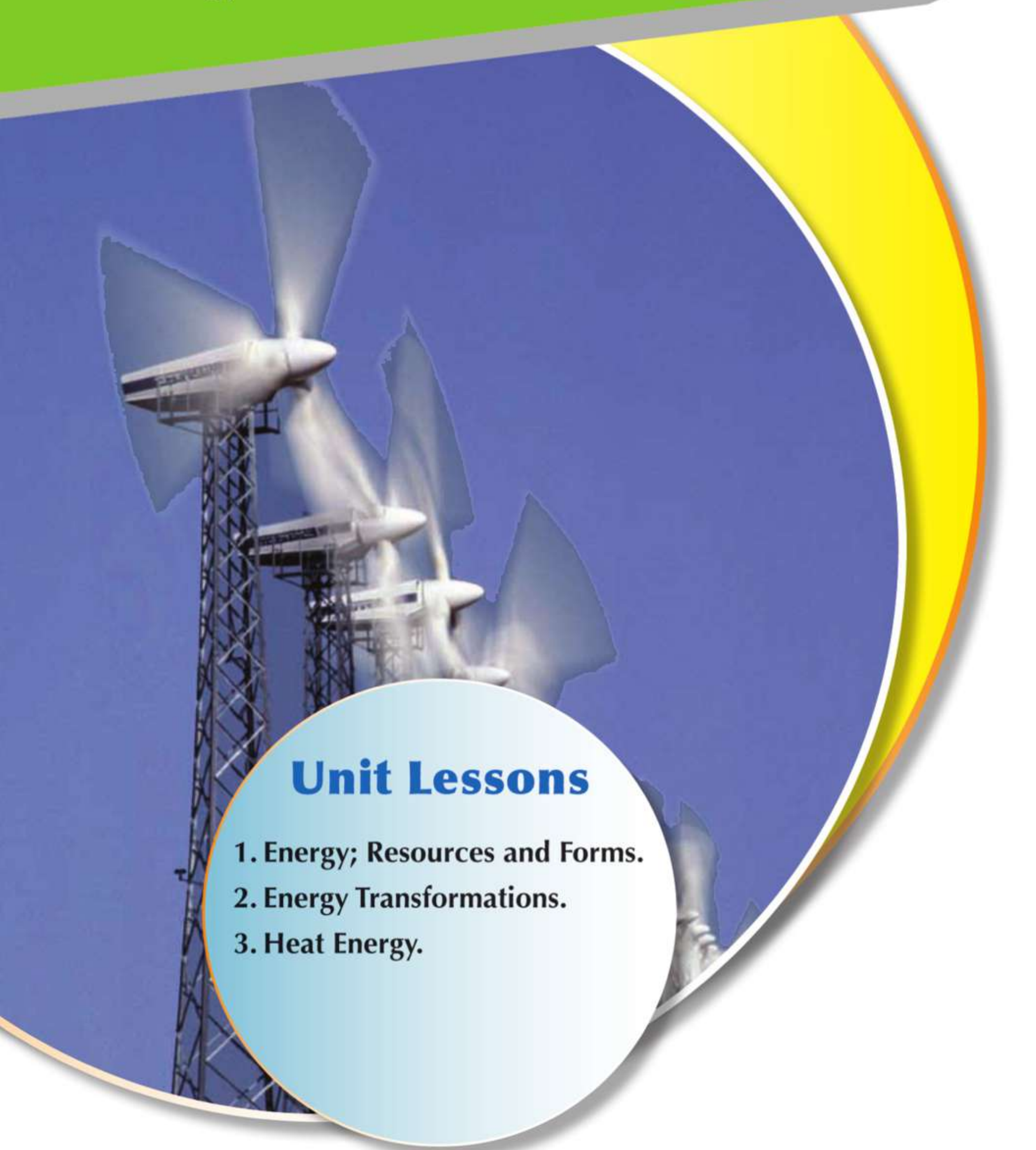
B. **Write down the formula by which you can find each of the following:**

Density – the number of electrons that saturates the energy level of an atom.

Unit Two

Energy

- Energy Resources and Forms.
- Energy Transformations.



Unit Lessons

1. Energy; Resources and Forms.
2. Energy Transformations.
3. Heat Energy.

Objectives

By the end of this unit, a student will be able to:

1. Identify the energy concept.
2. Identify the energy resources.
3. Deduce energy forms.
4. Illustrate experimentally conversion of chemical energy into other forms of energy.
5. Compare between potential and kinetic energies.
6. Compare among the other energy forms.
7. Identify heat concept.
8. Explain the relation between temperature and speed of particles.
9. Illustrate the benefits of technology in using energy resources.
10. Identify the negative influence of technology.
11. Mention examples on technology applications in the domain of energy transformations.
12. Design with some peers a simple electric cell from the materials of local environment.
13. Design a simple electric circuit to show the flow of electric current.
14. Numerate energy forms which we can obtain from the sun.
15. Appreciate the God blessing of energy in the universe.

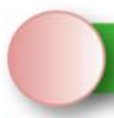
Lesson One

Energy; Resources and Forms



Lesson Items

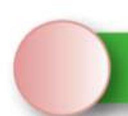
1. Energy.
2. Energy Forms.
3. Energy resources.



Lesson Objectives

By the end of this lesson, a student will be able to:

- Identify the energy.
- Identify eras in which man has used energy.
- Illustrate technology benefits of using energy.
- Compare potential and kinetic energies.
- Compare among different forms of energy.
- Appreciate the God blessing of energy forms and resources.



Life Issues

- International conflict to gain energy.

- Man needs the different forms of energy to operate devices and equipment.





Activity 1 (Fuel and energy)

What do you expect if the car is not provided with fuel? ....

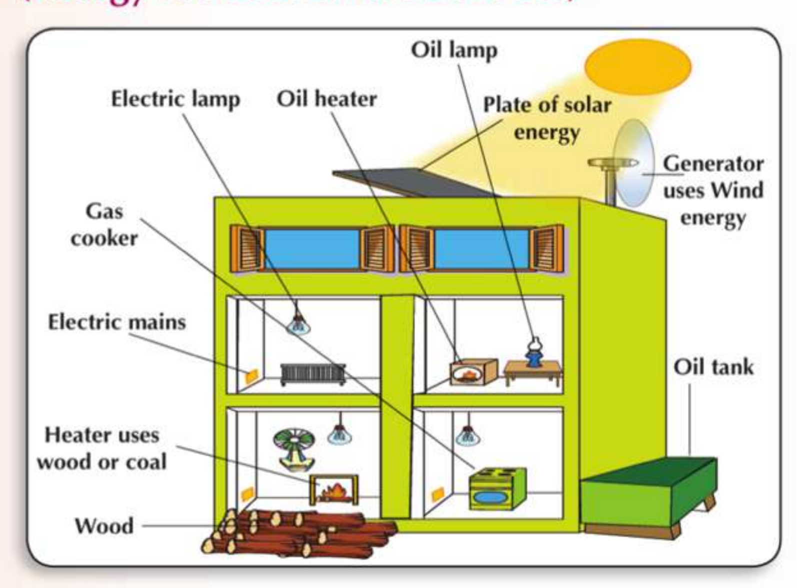
What do you expect if you do not eat any food for a long time? ....

Explanation: energy produced by burning fuel inside the car engine makes the car able to move, also energy produced from food enables man to perform his activities and to do work.

Energy is the ability of doing work or cause a change.

Activity  2 (Energy forms and its resources)

The following figure shows different forms of energy and different resources: Identify These forms and resources then record in the following table:



Energy forms	Energy resources

Energy forms:

1. Mechanical energy (potential + kinetic)
2. Light energy
3. Sound energy
4. Electric energy
5. Chemical energy
6. Heat energy
7. Nuclear energy

Energy resources are:

1. Sun
2. Wind
3. Food
4. Fuel
5. Water motion
6. Nuclear energy

Potential energy and kinetic energy:

Activity 3 (Energy interchanges from potential to kinetic)

- Raise a tennis ball up to your head level, let it fall, notice the ball during falling then rising and so on.
- Try with your peers to find if the work done, to raise the ball has disappeared.
- Did the ball gain an additional energy or did it keep the work done at the beginning?
- Record your observation: ....
- Conclusion: ....



Explanation: As the ball is raised, it gains potential energy which equals the work done in raising it. When the ball is left to fall the potential energy is converted into kinetic one. Then this kinetic energy is converted again into potential one as the ball returns to rise and so on.

- The work done is stored in the form of potential energy.
- Work done = force x displacement.
  (Displacement in case of potential energy = height).

- Potential energy: energy stored in the object due to a work done on the object.
- Kinetic energy: work done during the motion of an object.

- On reaching the ground the object has only kinetic energy which equals at this moment the mechanical energy.
- At maximum height the mechanical energy of the object is only its potential energy.
- The sum of potential and kinetic energies of an object is the mechanical energy.

Factors affecting potential energy:

Activity 4 (The effect of weight on potential energy)

- Take 4 identical spheres, let them on plared ground.
- Raise one sphere from ground up to a table level.
- Raise two spheres up to the same level of the table.
- Repeat using 3 spheres.
- Record notes about the effort you feel each turn: ....

Potential energy stored in an object increases as the weight of object is increased.

Activity 5 (The effect of height on the potential energy)

- Bring a somewhat heavy sphere.
- Raise the sphere half a metre height and let it fall.
- Repeat what done and increase the height each time.
- What do you notice in each time the sphere reaches the ground? ....
  ....

Potential energy increases by the increase of height at which the object reaches.

Potential energy = weight x height

- Weight = mass x acceleration due to gravity (assumed acceleration due to gravity is constant in one place).

Factors affecting the kinetic energy:

Activity 6 (The effect of both mass and speed of motion on the kinetic energy)

A. 2 cars of identical mass, which one needs more work to stop if one car is moving faster than the other? ....

B. Two cars one has a mass larger than the other, are moving at same speed, which needs more work to stop? ....

The kinetic energy of moving objects increase by the increase of each of mass and speed of motion.

Kinetic energy = 1/2 x mass x square of the speed.

Mechanical energy = kinetic energy + potential energy.

Exercise Calculating the mechanical energy:

Numerical Example:

A ball was launched upwards and vertically at a speed 3 m/s up to a height 4 m. Calculate the mechanical energy of the ball if its weight is 5 Newton, and has a mass 0.5 Kg.

Solution: Potential energy = weight of the ball x height = 5 x 4 = 20 Joule

Kinetic energy = 1/2 x mass x square of speed = 1/2 x 0.5 x (3 x 3) = 2.25 Joule

Work done = Mechanical energy = potential energy + kinetic energy = 20 + 2.25 = 22.25 Joules.



Optional Activities:

Choose one of the following activities, and try with your peers in the class to perform it: Ask your teacher to evaluate.

1. Name the energy forms in your home then determine devices which depend on one of these forms.
2. Write a short account about the importance of energy in our life.



Summary



- Energy: is the ability of doing work.
- Energy forms:
  - Light energy.
  - Sound energy.
  - Electric energy.
  - Chemical energy.
  - Heat energy.
  - Nuclear energy.
- Energy resources:
  - Sun.
  - Wind.
  - Food and fuel through chemical reactions.
  - Water motion.
  - Nuclear reactions.
- Potential energy: energy stored in an object due to work done on it.
- Kinetic energy: work done during motion.
- Potential energy = weight of the object x height.
- Kinetic energy = 1/2 x mass x square of speed.
- Mechanical energy = potential energy + kinetic energy.
- Weight = mass x acceleration. due to gravity

Exercises

Question 1:

Choose the correct answer:

1. Resource of permanent energy is ....
   A. Petrol. B. Sun.
   C. Nuclear reactions. D. Coal.
2. Mechanical energy is the sum of .... energies.
   A. Potential and heat. B. Light and kinetic.
   C. Potential and kinetic. D. Potential and light.
3. An object of 20 N weight is placed at 5 m height, it has a potential energy of ....
   A. 50 J. B. 150 J.
   C. 100 J. D. 200 J.
4. An object of mass 2 kg is moving at a speed of 4m/s has a kinetic energy of ....
   A. 16 J. B. 64 J.
   C. 32 J. D. 128 J.
5. Chemical energy can be stored in ....
   A. Car battery. B. Stretched spring.
   C. Raising a load upwards. D. Car lamps.
6. As doubling height to which an object is raised from ground so the ....
   A. Kinetic energy is increased to its double value.
   B. potential energy is increased to 3 times.
   C. Potential energy is increased to double value.
   D. Mechanical energy is increased 4 times.

Question 2:

The developed countries aim to use solar energy, wind and water motion more than before.. Explain.

Question 3:

Compare between potential and kinetic energies of an object.

Self reflection and self evaluation

Dear student, as you finish the study of matter and its characteristics try to fill in this card:

A. What are the items you liked in the lesson?

....

B. What are the items you didn't like in the lesson?

....

C. What are the errors you have done during experiments and activities performance?

....

D. What are the errors you can avoid in next activities?

....

E. What is the best expression you have heard in this lesson?

....

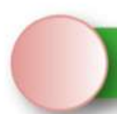
Energy Transformations

Lesson Two



Lesson Items

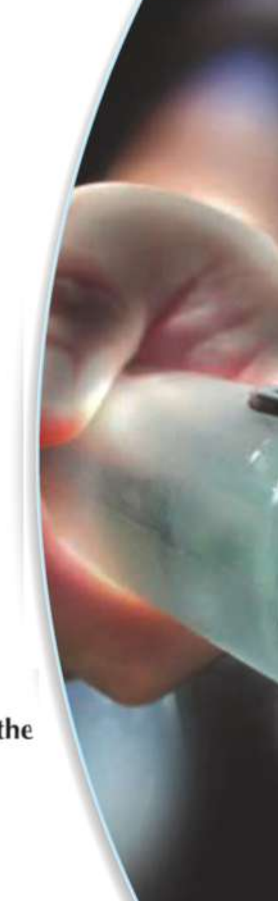
1. Energy conservation.
2. Technology and energy transformations.



Lesson Objectives

By the end of this lesson, a student will be able to:

- Identify law of energy conservation.
- Design a model of a simple electric cell from materials of local environment.
- Name the benefits of technology in using energy resources.
- Give examples of technology applications of energy transformations.
- Make experiments to change chemical energy into heat, electric and mechanical energy.
- Name some negative effects of technology and its danger on man and the environment.



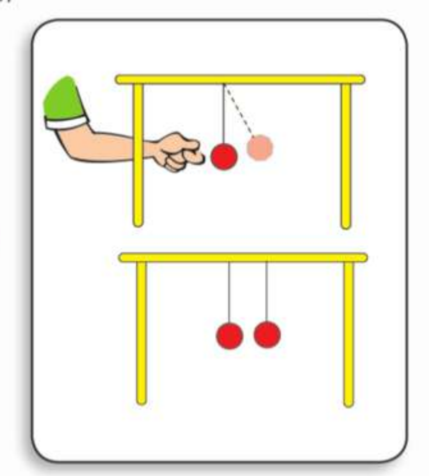
Life Issues

- Technology and society.



Previously you have studied transformation of energy, for example in the electric bulb the electric energy is changed into light, also in the electric iron the electric energy is changed into heat energy and so on.

Activity 1 (Conservation of mechanical energy)



Push with your hand gently a simple pendulum then leave it.

- Record your observations about the pendulum motion. ....

Repeat the procedure with two pendulum shown in the figure:

- Record your observations ....

On displacing the pendulum, a work is done, this work is stored in the form of potential energy. When it is left the potential energy is converted gradually into kinetic energy till it reaches a maximum speed where all of its energy is converted into kinetic one.

This is repeated while the pendulum keeps its mechanical energy.





Exercise 1



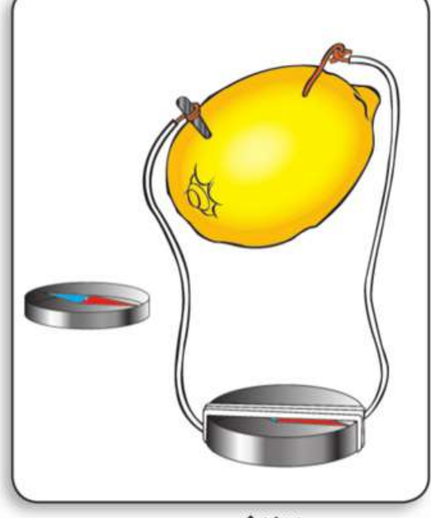
How much alike are the motions of the children swing and the pendulum?

- What do you observe? ....
- Conclusion: ....

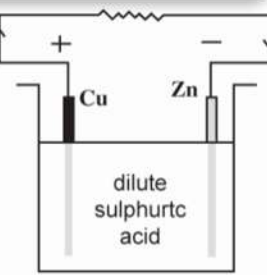
In both the swing and the pendulum, the potential and kinetic energies are interchanged without ending, the sum of the two energies at any moment is constant.

Simple electric cell:

Activity 2 (Lemon and electricity)



- Materials:
  1. A large lemon.
  2. A small compass.
  3. A copper wire.
  4. A zinc rod.
- Procedures:
  - Try to soften the lemon.
  - Dip the zinc rod and the copper wire in the lemon .Form an electric circuit near a compass as in figure.
- What do you observe? ....
- Conclusion: ....

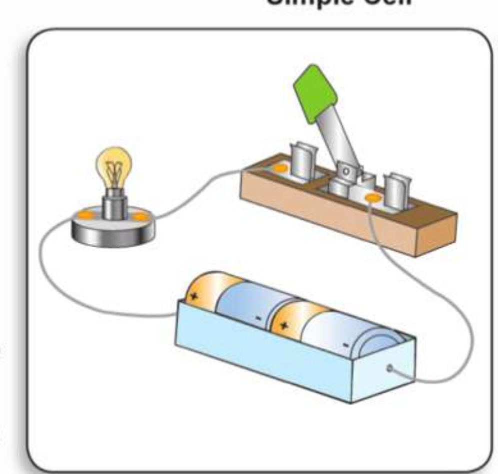


Simple Cell

Simple Electric cell is composed of an acid solution with two different metals dipped in. Chemical reactions convert chemical energy into electric energy.

Remark: try to use some tubers of potatoes instead of lemon .Does it also produce electricity?

Activity 3 (Electric circulation)



- Materials:
  1. A Dry electric cell.
  2. A light electric bulb.
  3. Wires for connection.
  4. A switch.
- Procedures:
  - Make an electric circuit as in the figure shown.
  - Let circuit off for one minute then switch it on.
- What do you observe? ....

Conclusion: lighting of the electric bulb due to flow the electric current when the switch is closed.

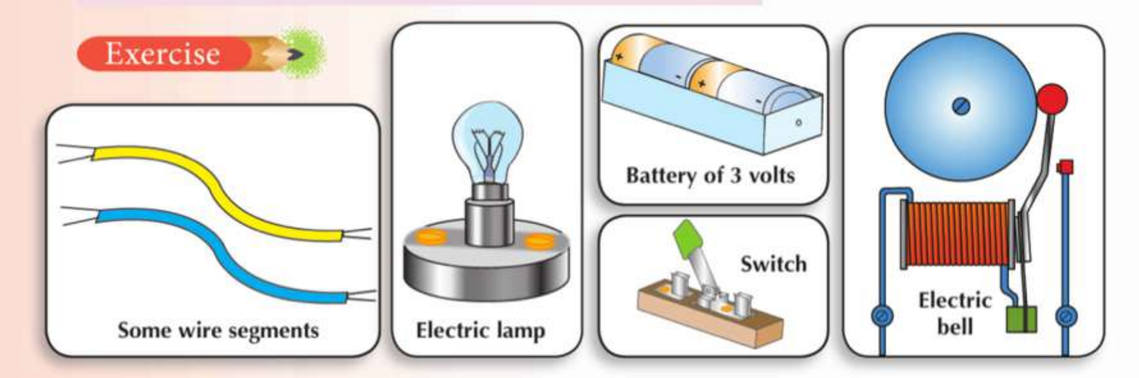
- Touch the glass of the bulb after asking your teacher.
- What do you observe? ....
- Conclusion: ....

Attention

- Don't touch glass bulb of light lamp at home while it is on, because it is of a very high temperature.

In the electric lamp; electric energy is converted into light energy and heat energy.

Exercise



Use the materials and objects shown above to set a tool to let a deaf friend has attention, also to set another tool for the same purpose for a friend who can not see.

Activity 4 (Energy transformations)

On operating a car engine, several transformations of energy take place. Mention some of these transformations ....

Inside the car:

- Fuel stores chemical energy which burning inside the car and is converted into heat energy which produces mechanical energy that causes the car to move.
- The electric generator (dynamo) converts a part of mechanical energy into electric energy.
- A Part of electric energy is converted into light energy in the car lamps.
- Another Part of electric energy is converted into sound energy of the car in the radio cassette.
- A third part of the electric energy is converted into heat energy once again in the heater of the air conditioning of the car and so on.

We had studied:

Energy is not destroyed but can be transformed from one form to another with numerous applications of technology, like the internal combustion engine (car engine) – dynamo – electric lamp – radio sets – and electric heater.

From the previous transformations, we can deduce the law of energy conservation.

Law of energy conservation:

Energy is neither created nor destroyed but it is converted from one form to another.




(2)

- Look around and name the applications of technology then name the energy transformation found in.

Energy and environment :

- Role of technological Applications:

Using energy resources and energy transformations from a avialable form to another which man needs in his life.

Technology has negative effects since man used it in:

1. Wars and killing.
2. Massive destruction.

Some technology applications cause environmental pollution; such as chemical pollution of air, pollution of water, pollution of soil, electromagnetic pollution and noise pollution.
and ..... etc.

Activity 5 (Energy and environment)

There are some harms of technological applications of energy transformation. What harm is caused by each of the following:

1. Car exhaust ....
2. Chemical pesticides ....
3. Nuclear weapons ....
4. The networks of wireless transmitters of cellular phones ....

Optional Activities:

Choose one of the following activities to do with some of your peers in the class, ask your teacher to evaluate the report

1. Draw a diagram map to illustrate the energy transformations which takes place in each of:
   A. A Television set.
   B. A Cellular phone.
   C. A Sewing machine.
2. Draw a simple electric circuit of a battery, a switch, an electric motor rotates a light fan and an electric lamp then write down the role of each below the drawing.



Summary



- Law of energy conservation:

  Energy is neither created nor destroyed but it can be transformed into another form.

- Role of technological Applications:

  Using energy resources and energy transformations from a avialable form to another which man needs in his life.

- Technology has negative effects when man used technology in:
  1. Killing and wars.
  2. Massive destruction.

- Role of technological Applications:

  Using energy resources and energy transformations from a form to another which man needs in his life.

- Technology has negative effects when man used technology in:
  1. Killing and wars.
  2. Massive destruction.

Exercises

Question 1:

Choose the correct answer:

1. Electric energy is converted into kinetic energy in ....
   - A. Electric lamp.
   - B. Cellular phone.
   - C. Electric fan.
   - D. Electric bell.
2. Energy is neither created nor destroyed but it can be transformed into another form, this law is known as law of ....
   - A. Conservation of energy.
   - B. Conservation of matter.
   - C. Kinetic energy.
   - D. Earth gravity.
3. The role of technological application is represented in ....
   - A. Using energy resources and converting energy from a form to another.
   - B. creating energy from nothing.
   - C. Storing energy as its form is.
   - D. Illustrating energy forms.
4. In the solar cells the solar energy (sun light) is directly converted into into .... energy.
   - A. Kinetic.
   - B. Light.
   - C. Electric.
   - D. Sound.

Question 2:

How can you explain the efforts of some countries to share in some organizations which concern the environment protection? Do you think that we need such organizations?

Question 3:

Illustrate some technological applications in our life then mention their negative effects?





Self reflection and self evaluation

Dear student, as you finish the study of energy transformation try to fill in this card:

A. What are items you have liked in the lesson?

....

B. What are items you didn't like in the lesson?

....

C. What are the errors you had done during experiments and activities performance in the lesson of energy transformations?

....

D. What is the activity you have done in this lesson and you got admired?

....

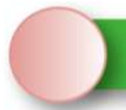
E. What is the best encouragement you have achieved about this lesson?

....

Heat Energy

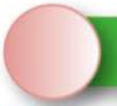


Lesson Three



Lesson Items

1. Heat concept.
2. Relation between heat and particles movement.
3. Technology and obtaining heat.



Lesson Objectives

By the end of this lesson, a student will be able to:

- Identify the heat concept.
- Explain the relation between temperature and speed of particles.
- Do experiments of converting mechanical energy into heat energy.
- Compare between the technological applications in different energy transformations.



Life Issues

- Environment protection.

Since man has realized heat, he is in a continuous search to find out the nature of heat and how it transfers.

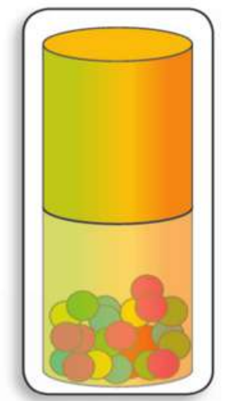
 **Activity 1 (Heat and its transafer)**

1- Tie a hollowed metal piece (for example a nut fastener) by a thread, and put it in boiling water for a few minutes, as shown in figure.
2- Use a centigrade thermometer to measure the temperature of the hot water that can be considered as the temperature of the metal piece.
   Record the thermometer reading (1) = …………… degree centigrade.
3- Get a suitable amount of tap water in a foam cup. Use the thermometer to measure the temperature of water in the cup.
   Record the thermometer reading (2) = …………… degree centigrade.
4- Lift the metal piece by the thread from the hot water, and then submerge it in the tap water cup . Wait for a few seconds.
5- Use the thermometer another time to measure the temperature of water in the cup.
   Record the thermometer reading (3) = …………… degree centigrade.

What has happened to the temperature of the metal piece when submerged in the tap water?
What has happened to the temperature of the tap water after the metal piece is submerged in it?

Activity 2 (Movement of the particles and temperature)

1. Put some identical spheres made of metal in a plastic cup then determine the spheres temperature first.
2. Place another identical cup above the first one so that they are tightly together as in figure.
3. Invert the positions of the two cups upside down from 20 to 30 times then determine temperature at the end.



- Record your observations: ....
- What is your explanation: ....
- Conclusion:

1. Spheres movement and its friction with each other causes temperature rise.
2. Temperature is raised as speed of spheres increases, i.e. as the kinetic energy of the particles increases.

Activity 3 (Temperature and friction)

1. Place your bicycle inverted upside down as in the figure opposite.
2. Let the pedal turn fast, then press the bicycle brakes strongly.
3. As the rotation stops touch the frame of the wheel, what do you feel? ....
....



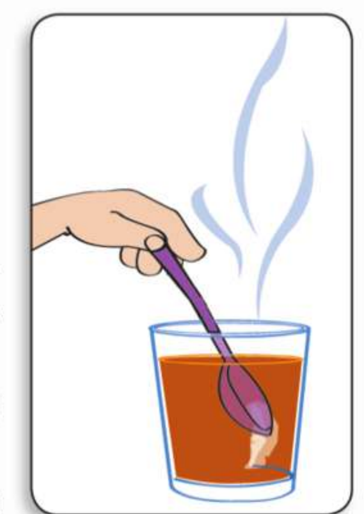
- Conclusion: ....
....

Friction turns mechanical energy into heat energy.

Heat energy: is a form of energy which transfers from a higher temperature object to a lower temperature object.

Temperature: it is the condition which determines the direction of heat energy whether from or to the object when it comes in contact with another, temperature is directly proportional to the kinetic energy of the particles.

Activity  4 (Heat transferring)

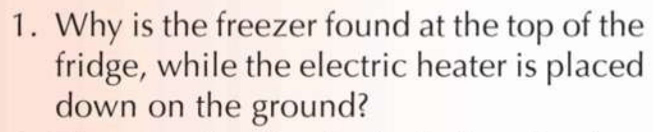


1. Put a metal spoon in a cup of hot tea.
   - What do you feel? ....
   - Conclusion: ....
2. Switch on an electric heater in the room, how is heat transferred from it? ....
   - Conclusion: there are three ways for heat transfer:

     A. Heat transfers by conduction: heat transfers through solids from one end to another.

     B. Heat transfers by radiation: heat transfers from hot object to another without any need for a material medium through which heat transfers.

     C. Heat transfers by convection: heat transfers in gases and liquids where hot layers have less density, and rise upwards while colder layers have more density and fall down.



Exercise

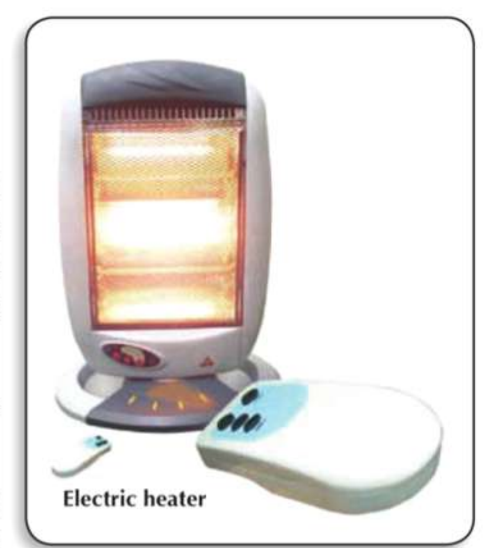


1. Why is the freezer found at the top of the fridge, while the electric heater is placed down on the ground?
2. There are a lot of technological applications to produce heat in our environment.

Determine three of these applications, then compare among them from your point of view of their effect on the environment.

Technological applications to produce heat:

1. Heater.
2. Water heater.
3. Stove.
4. Ovens.



Electric heater

Some of these applications work by petrol fuel (as a non permanent Resource). Some other applications work with solar energy as a permanent Resource).

Some pollute the environment, some others do not.

On studying the different energy resources, we find that most of the resources depend on that energy produced by sun.

Exercise

1. Regarding the technological applications and energy transformations mention some technological applications which use the solar energy and change it into other forms.
2. Think of the relation of solar energy with the rest of energy resources and forms you use.

Optional Activities:

Choose one of these activities and try to perform it

1. Write a research on the relation among all energy forms with solar energy, then represent it in front of your peers to discuss them
2. Draw a sketch diagram which illustrates energy transfer from solar energy to other four energy forms, at least.





Summary



- Heat energy:

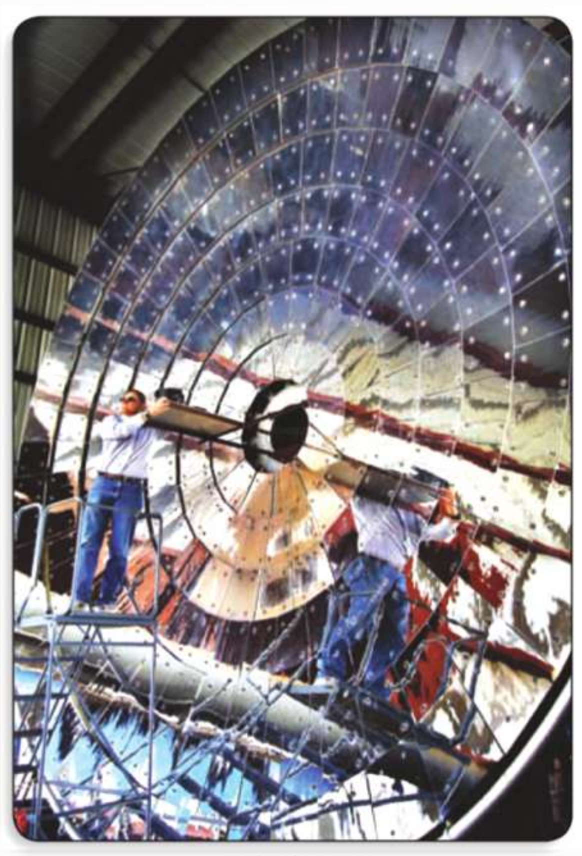
  One of the energy forms transfers from a higher temperature object to a lower temperature object.

- Temperature:

  It is the heat condition which determines whether heat transfers from or to an object when it comes in contact with another. And it is directly proportional to the kinetic energy of the particles.

- Ways of heat transfer:

  1. Heat transfers by conduction.
  2. Heat transfers by radiation (does not need any material medium).
  3. Heat transfers by convection.



Solar furnace

- Technological applications which produce heat:

  1. Heater.
  2. Water heater.
  3. Stove.
  4. Ovens.

  The origin of most of energy resources and its forms on Earth's surface is solar energy.

Exercises

Question 1:

Choose the correct answer:

1. The mechanical energy is converfed into heat energy by ....
   A. The electric generator (dynamo).
   B. The water heater.
   C. Friction of movement objects.
   D. The electric motor.

2. Heat transfer by radiation takes place through ....
   A. Liquids only.
   B. Gases only.
   C. Material media and nonmaterial ones.
   D. Metals only.

3. In solar heaters, solar energy is converted into ....energy.
   A. Light.
   B. Electric.
   C. Heat.
   D. Kinetic.

4. Sun is ....
   A. Resource of permanent energy.
   B. Resource of non permanent energy.
   C. Not an energy resource.
   D. Producing no energy.

Question 2:

How can you interpret?

It is preferred using solar heater to any other heater such as electric or gas ones.





Question 3:

Complete the following table by suitable completion:

Technological applications	Resource of energy Permanent/ nonpermanent	Effect on environment Polluting/non polluting
Electric heater		
Electric water heater		
Solar heater		
Electric stove		
Gas stove		
Solar oven		

Self reflection and self evaluation

Dear student, after studying the lesson try to fill in this card:

A. What are the items you liked in the lesson?

....

B. What are the items you didn't in the lesson?

....

C. What is the best activity you have done?

....

D. What are the problems you have faced on performing the activities?

....

Unit 2: General Exercises

Question 1:

Choose the correct answer to complete the following statements:

1. In the filament of electric lamp the ....
   - A. Electric energy is converted into mechanical energy.
   - B. Light energy is converted into heat energy.
   - C. Electric energy is converted into heat energy.
   - D. Chemical energy is converted into light energy.
2. When car lamps and radio cassette are on, there is a change inside the car battery from ....
   - A. Chemical energy into a light one.
   - B. Chemical energy into a sound one.
   - C. Chemical energy into an electric one.
   - D. Electric energy into light one.
3. In home when the gas stove is working there is a change from ....
   - A. Heat energy into a chemical one.
   - B. Chemical energy into a heat one.
   - C. Chemical energy into a sound one.
   - D. Light energy into a heat one.
4. As an object falls downwards ....
   - A. The potential energy increases.
   - B. The kinetic energy increases.
   - C. The mechanical energy is lost.
   - D. The speed of the object decreases.
5. As an object is launched upwards, ...
   - A. Its speed decreases.
   - B. Its speed increases.
   - C. Its kinetic energy increases gradually.
   - D. Its potential energy decreases gradually.
6. In the simple pendulum, there is an energy transformation from ....
   - A. Mechanical energy into a sound one.
   - B. Mechanical energy into a light one.
   - C. Potential energy into a kinetic one and vice versa.
   - D. Kinetic energy into a heat one.
7. Heat is transferred through solids by ....
   - A. Conduction and convection.
   - B. Radiation only.
   - C. Radiation and convection.
   - D. Conduction only.
8. Heat transfers from a heater by ....
   - A. Conduction and radiation.
   - B. Radiation and convection.
   - C. Conduction and convection.
   - D. Radiation only.



Question 2: What is meant by the following?

A. Potential energy of an object is 20 Joule.

B. Potential energy of an object is 20 Joule.

C. Mechanical energy of an object is 100 Joule.

D. Heat energy.

Question 3: Give reasons for:

A. The freezer is found at the top of fridge.

B. The heater is placed on the ground.

C. Fuel in a car as food for a man.

D. Nuclear stations which produce electricity are preferred to those of petrol stations.

E. Ecologist do not appreciate all the technological applications which used in energy transformations.

Question 4:

Name five of the technological applications which convert an energy form to another. Then mention what the energy transformation in each application is.

Question 5:

A stone of 5 Kg mass falls from 8 m height, what is its potential energy? And what is its kinetic energy? In each of the following:

A. At the start of falling.

B. At height 2m.

C. On reaching ground (consider gravity acceleration = 10 m/ s^2).

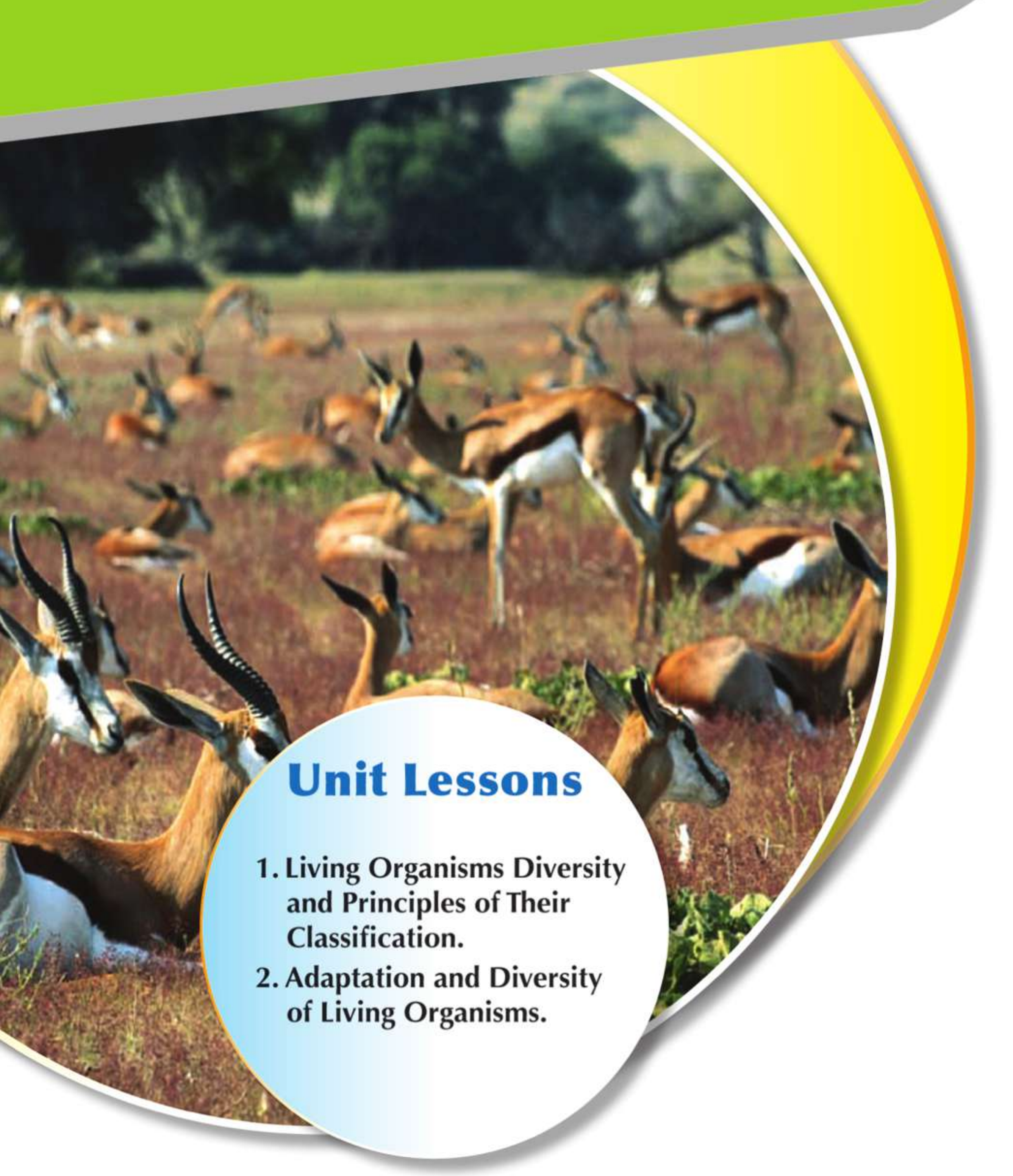
Question 6:

Find the weight of an object of potential energy 88 Joule when found at a height 11 m.

Question 7:

An object has a kinetic energy 64 Joule and is moving at a velocity 4 m/s. Find the object mass.

Unit Three
Diversity and Adaptation in Living Organisms



Unit Lessons

1. Living Organisms Diversity and Principles of Their Classification.
2. Adaptation and Diversity of Living Organisms.

Objectives

By the end of this unit, a student will be able to:

1. Observe the diversity among living organisms in its environment.
2. Plans to classify living organisms.
3. Explain some principles of living organisms classification.
4. Design tables to classify living organisms existed in his environment.
5. Design with his classmates an album to classify some living organisms.
6. Use the microscope to examine microorganisms.
7. Infer that the species is the basic unit of classification for living organisms.
8. Identify the adaptation concept.
9. Discuss his classmates about the reasons of adaptation.
10. Identify the types of adaptation.
11. Give evidences for adaptation in living organisms.
12. Analyze the functional suitability to different types of the bird beaks and legs coped with their life styles and feeding.
13. Understand the need of predator plants to capture insects as a resource of nitrogenous substances.
14. Know more about the reasons of living organisms adaptation.
15. Understand the reasons of hibernation, aestivation and bird immigration.
16. Appreciate the grandeur of Allah and Allah's peerless ability.

Living Organisms Diversity and Principles of Their Classification

Lesson One

Lesson Items

1. Diversity of living organisms.
2. Principles of classification.
3. The species is the basic unit of classification in living organisms.



Lesson Objectives

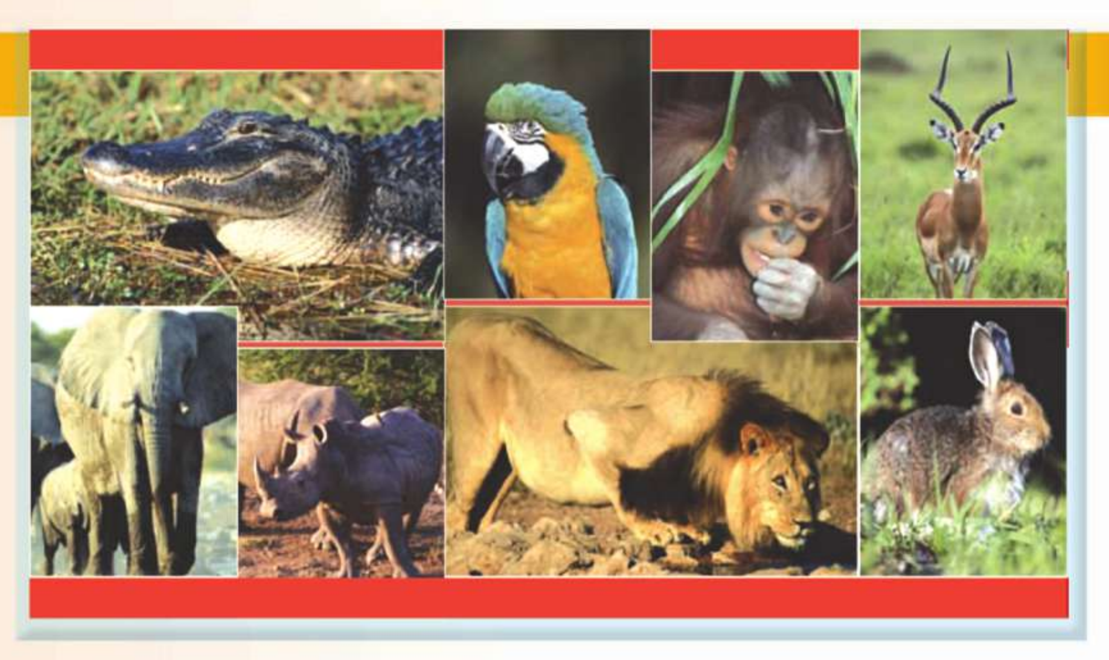
By the end of this lesson, a student will be able to:

- Observe the diversity among living organisms in their environment.
- Share his (her) classmates making classification plans for living organisms.
- Design tables to classify the living organisms existed in his (her) environment.
- Design an album with his (her) classmates to classify some living organisms.
- Use the microscope to examine microorganisms.
- Infer that the specie is the basic unit for classifying living organisms.



Life Issues

- Protecting living resources.



When you pay a visit to the zoo, You may see the animals in the zoo... And you observe how much the variety among these animals in the shape..., size..., and the way of feeding..., the environment where these animals live..., and a lot of other different characteristics that living organisms differ from each other.

There are big animals such as the elephant, and rhinoceros .... and small animals such as the rabbit, rat and lizard. There are animals live in water such as fish, crocodiles and hippopotami and others live on land such as the horse, lion and dog.

Variety is not only restricted to animal world but we can also see it clearly in plant world.

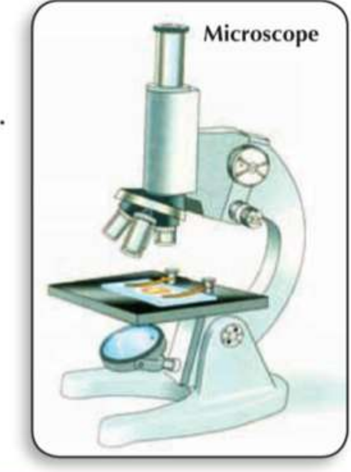


We see huge trees such as camphor and palms... and short weeds such as clover and gargeer... plants carry large - sized leaves such as banana plants... others carry small - sized such as molukhiyah.

Diversity of micro organisms:

Diversity also extends among living organisms to the micro organisms which can't be seen with nacked eye, but they spread out everywhere around us in air soil and water. They can be seen only by the microscope.

Activity 1 (Examining a drop of pond water)



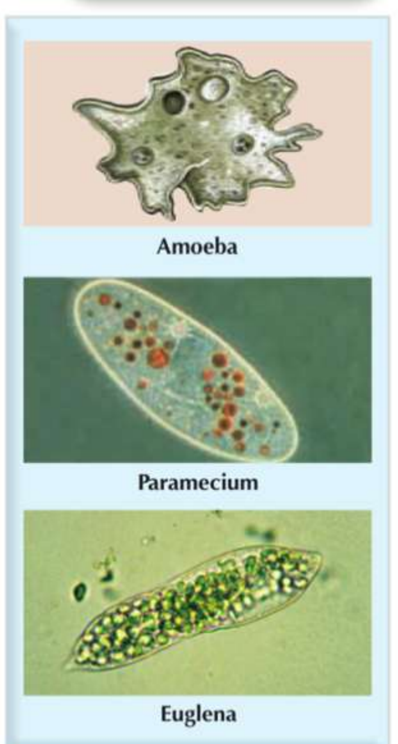
- **Materials:**
  - Pond water.
  - A glass slide.
  - A glass cover slip.
  - Methylene blue dye.
  - A dropper.
  - A light microscope.

- **Procedures of preparing the sample:**
  1. Add a drop of methylene blue solution to a little amount of pond water.
  2. Put a drop of pond water on the glass slide and cover it gently with a glass cover slip.

- **Procedures of examining the sample:**
  1. Put the glass slide on the microscope stage and use the small objective lens to examine the sample.
  2. Repeat the sample examination using a high power objective lens.

- **Describe what you see:** ....

- **The results of examination:**
  - You may see a lot of organisms - most of them are unicellular organisms such as Amoeba, Euglena and Paramecium
  - These microorganisms differ from each other in shape... and the way of movement.





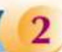


Living organisms classification plans:

Due to the enormous diversity of living organisms, it became compulsory to classify them into groups to ease their studying.

Here are some classifying plans based on scientific bases and principles:

First: Classifying plants according to the Shape:



Examine the plant samples in the pictures below, then share your classmates to classify these plants depending on the shape:


Red algae


Brown algae


Wheat


Corn

- Record your observations: ....
- Conclusion: plants differ according to the external appearance:

A. Some plants can't be distinguished into roots, stems and leaves such as the green, Red and brown algae.

B. Most plants can be distinguished into roots, stems and leaves such as corn, wheat, palms and camphor plants.

Second: Classifying plants according to the reproduction style

Plants are classified according to the way of reproduction into:

1. Plants reproduce by formation of spores: Voughair and Adiantum are examples of small terrestial plants that are known as ferns.



Voughair   Adiantum

2. Plants reproduce by the formation of seeds: They are divided into:

   A. Gymnosperms: The seeds of these plants are formed inside cones but not inside pericarp such as Pine and Cycas plants .



Pine   Cycas

   B. **Angiosperms (Flowering plants):** they are divided into:
   - Monocotyledon plants: such as maize and wheat plants.
   - Dicotyledon plants: such as beans and pea plants.



Pea



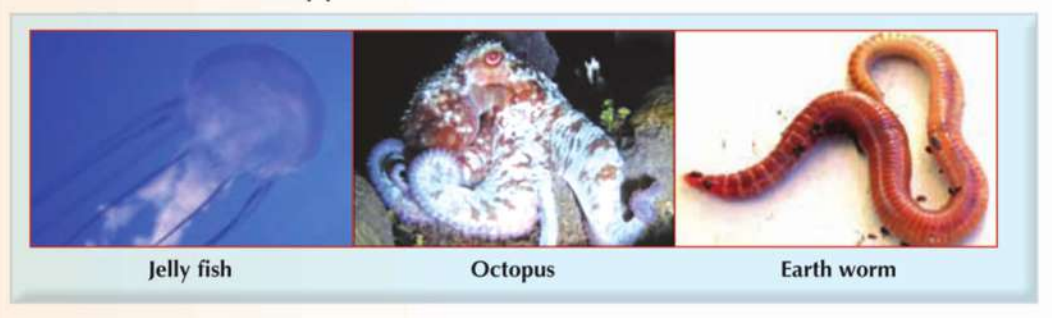




Third: Classifying living organisms according to the nature of body supporting

Animals are classified according to the existence of support into:

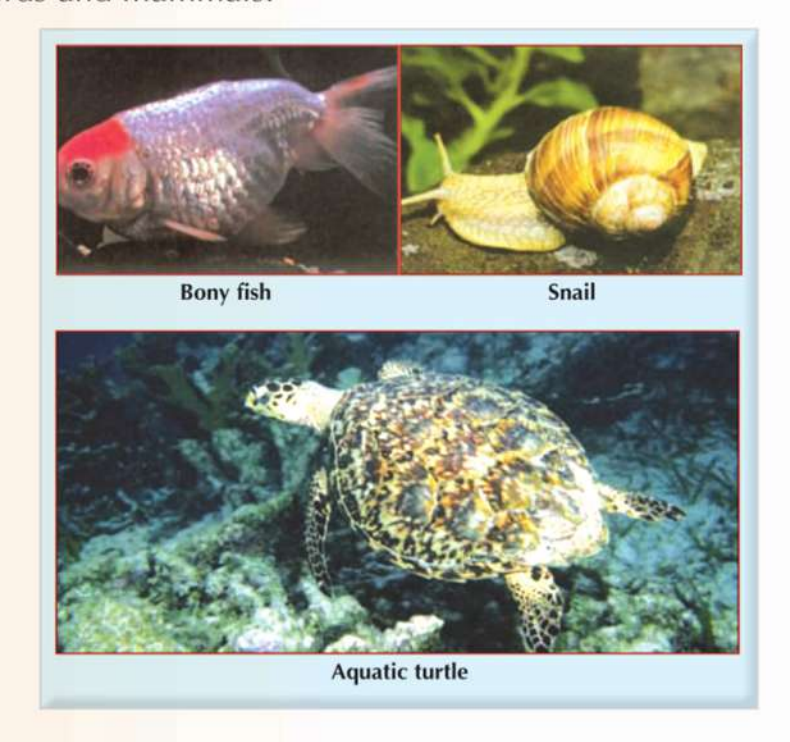
A. Soft bodies: Such as jelly fish, octopus, and worms where the body doesn't have a support.



Jelly fish — Octopus — Earth worm

B. Supported bodies: These animals are divided according to the location of the support into:

1. Animals with external support such as mussels and snails.
2. Animals with internal support as in vertebrates such as fish, reptiles, birds and mammals.



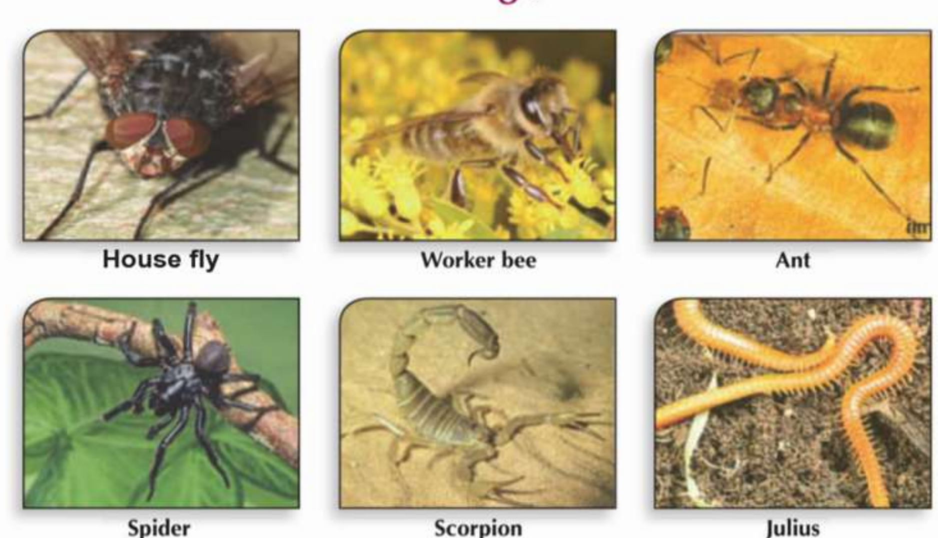
Bony fish — Snail

Aquatic turtle

Fourth: Classifying arthropods according to the number of legs:

Arthropods are invertebrate animals that are characterized by a type of legs known as jointed legs. Arthropods can be classified according to the number of these legs.

Activity 3 (Classifying arthropods animals according to the number of legs)



House fly — Worker bee — Ant

Spider — Scorpion — Julius

Examine the samples shown above. They are a group of arthropods. Classify them into groups based on the number of legs in each group. Record the results in the following table.

Arthropods	Number of legs
House fly / bee/ ant	....
Spider/ scorpion	....
Scolopendra/ Julius	....

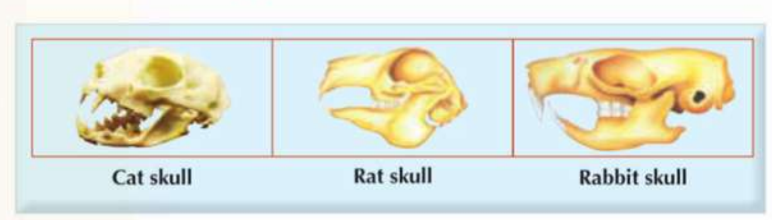
- Conclusion: Arthropods can be classified according to the number of legs into:
  1. Insects: have three pairs of jointed legs such as locusts, bees, flies, and cockroaches.
  2. Arachnids: have four pairs of jointed legs such as the spider and scorpion.
  3. Myriapods: such as scolopendra and Julius.



Fifth: Classifying mammals according to the type and number of teeth.

Activity 4 (Identifying the teeth type and number in some mammals)

Examina the skull of a cat, rat and a rabbit. Realize the shape, type and number of teeth in each of them.



Cat skull | Rat skull | Rabbit skull

- Record your observations: ....
- Conclusion: Mammals are classified according to the existence of teeth into:

A. Edentats (Teethless mammals): Such as the sloth and armadillo.



Sloth



Armadillo

B. Mammals having teeth: According to the shape and type, these mammals are divided into:

1. Animals have front teeth extending outwards such as hedgehog to capture the insects.
2. Animals have pointed - canines and molars with sharp projections such as the lion and tiger.



Hedgehog



Tiger



3. Animals have sharp incisors: are divided according to their number in each jaw into:
   - Rodents: these animals have one pair of incisors in each jaw such as the rat and squirrel.
   - Lagomorphs: these animals have two pairs of incisors in the upper jaw and only one pair in the lower jaw such as the rabbit.

Squirrel



Rabbit

Taxonomy

It is a branch of biology searching the similarities and differences among living organisms, and placing the similar ones in groups according to a certain system in order to ease their studying.

«Species» the basic classification unit for living organisms

Linnaeus had considered the species as fundamentals of a natural classifying system. To recognize the concept of species, let's perform the following activity:

Activity 5 (Classifying a group of animals into species)

Look carefully at this group of animals, then classify them according to their external shape.



Placing these animals into three groups is the best classification: the cat group, the dog group, and the rabbit group.

Cats differ from each other, but they are more different than rabbits, so it is impossible for cats to mate to rabbits whereas mating can take place between two any couple of cats whatever the difference is in shape or size, so cats are placed in one species whereas rabbits are placed in another one and so do dogs.

Enrichment information

- Marriage may take place among semi - similar species, but the produced offsprings are barren in the most of Cases For example, when an intermarrage take place between a donkey and a horse, they produce a barren female known as mule.

African, Asian and European human whatever their colors, race or home are, they all belong to one species «Human».

Species

Is a group of more similar living organisms inshape that can reproduce to give birth of new fertile individuals that are able to reproduce and therefore keeping the existence of the species .

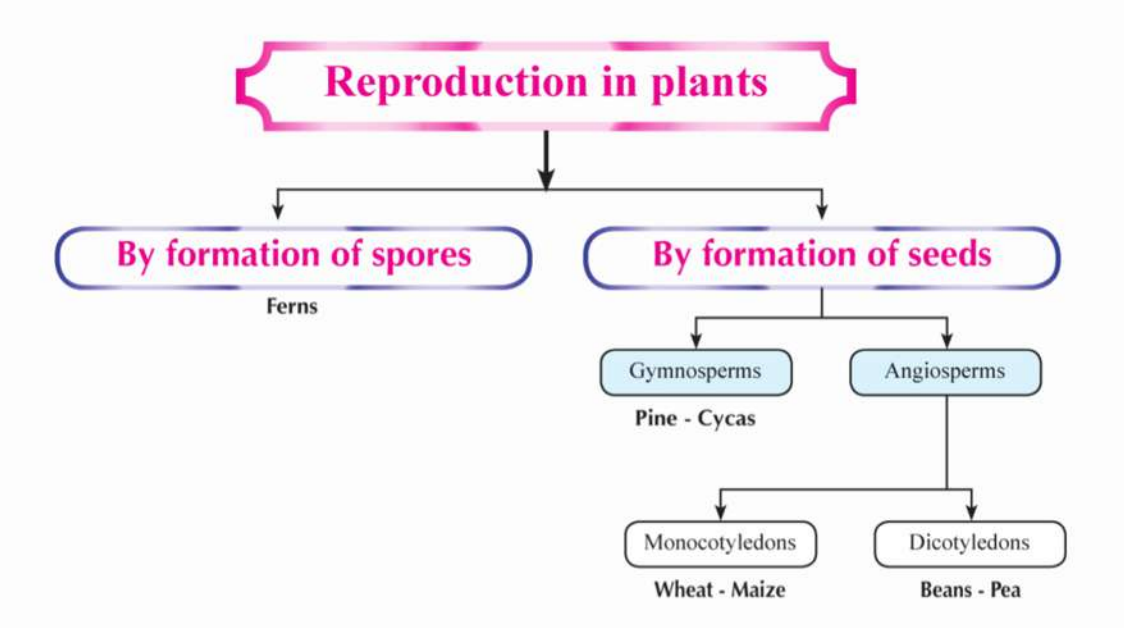
Optional Activities:

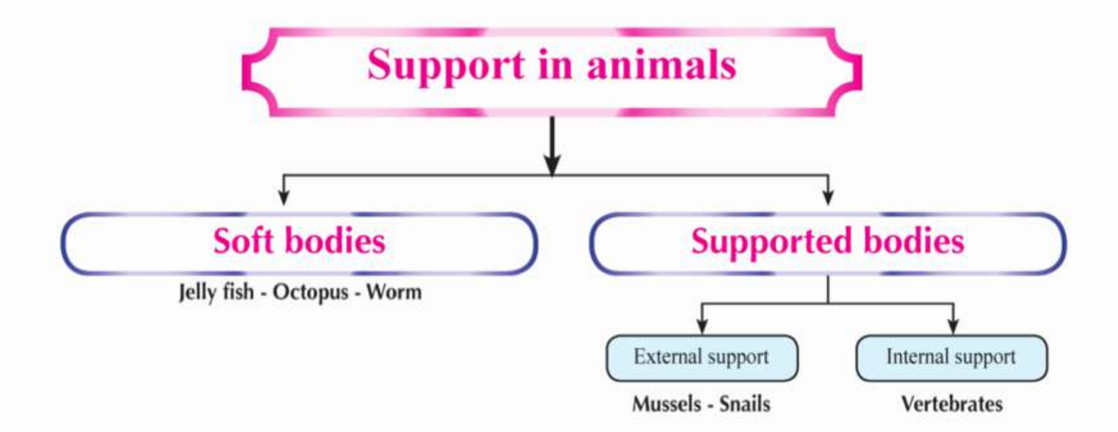
Of the optional activities, choose an activity and carry it out,

1. Collect some pictures of different living organisms, and classify them into groups. Then place them to your album.
2. Collect a large number of plant leaves and use newspapers (to remove water out of them) then classify them according to their:
   A. size. B. Shape.



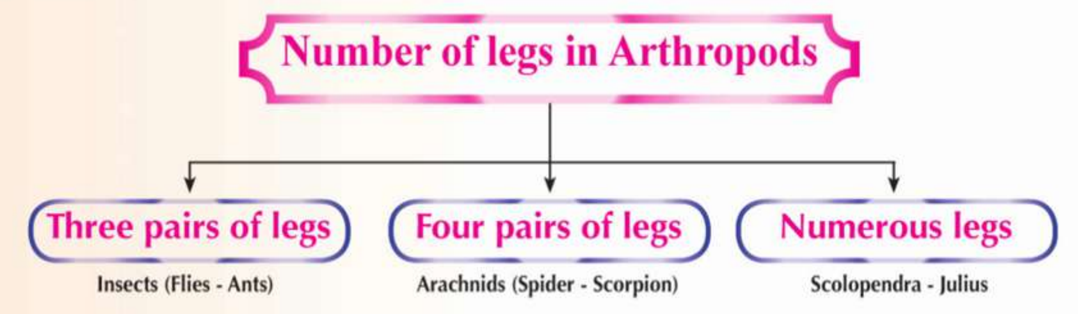
Plans for classifying some living organisms

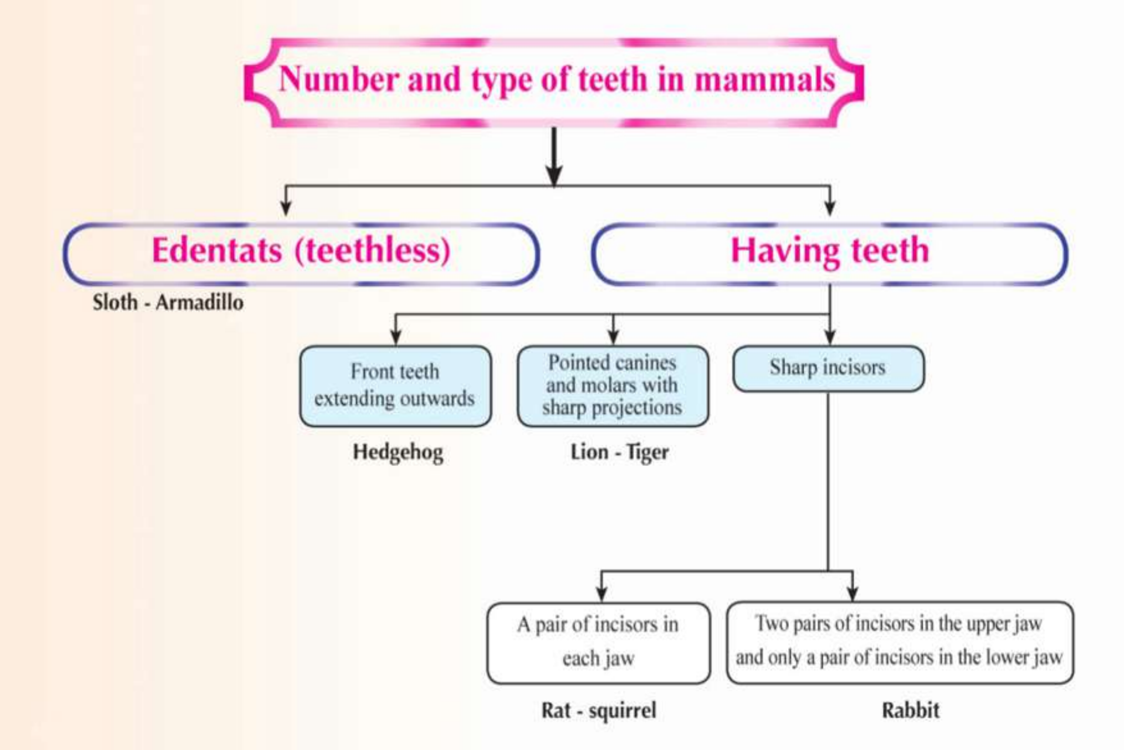












- Species: Is a group of living organisms mostly similar to each other in their shape characteristics and are able to mate and produce new fertilized members that are able, in turn, to reproduce and keep the species existence on.

Exercises

Question 1:

Complete the following:

1. ....and .... are teethless mammals.
2. Arthropods can be classified according to the number of legs into ...., ... and ....
3. .... and .... are used in classifying plants.
4. Some plants have large - sized leaves such as .... and some has small - sized leaves such as ....
5. .... is the basic unit of classification in living organisms.

Question 2:

Choose the correct answer:

1. The scorpion belongs to .... :
   (insects - myriapods - arachnids - mammals).
2. .... is an example for plants that reproduce by spores:
   (pine - beans - vougheir - wheat).
3. .... are from the animals which don't have a body support:
   (reptiles - snails - Jelly fish - cartilaginous fish).
4. The number of pairs in scorpion legs is ....
   (3 - 4 - 44 - 100).

Question 3:

Cross out the unsuitable word each of the groups below:

1. (Locust - Mosquito - Spider - Cockroach - Flies).
2. (Lion - Tiger - Dog - Wolf - Armadillo).
3. (Beans - Pea - Corn - Pine - Wheat).
4. (Octopus - Desert snail - jelly fish - Earth worw).

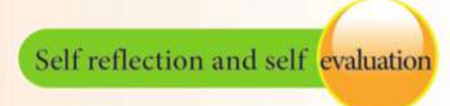


Question 4: Give reasons for:

1. Hedgehog has front teeth extending outwards.
2. Its impossible for cat to mate to rabbit.

Question 5: State a difference between each of the following:

1. A rabbit and a squirrel.
2. Beans plant and wheat plant.
3. The pine and palm trees.



Dear student, after studing the lesson try to fill in this card

A. What are the items you like in the lesson?

....

B. What are the items you dislike in this lesson?

....

C. Can you add more other classifying plans for the living organisms classification?

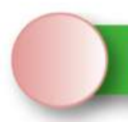
....

D. What are the problems you encountered in classifying living organisms?

....

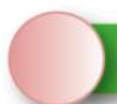
Adaptation and Diversity of Living Organisms

Lesson Two



Lesson Items

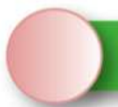
1. Adaptation «Types/reasons».
2. Adaptation and motion.
3. Adaptation and food nature.



Lesson Objectives

By the end of this lesson, a student will be able to:

- Recognize the concept of adaptation.
- Work with his (her) classmates to discuss the reasons of adaptation.
- Recognize the types of adaptations.
- Give evidences for adaptation in living organisms.
- Analyze the functional suitability of bird beaks and legs with the living and nutrition way.
- Understand the insectivorous plants requirement for catching insects as a resource of nitrogenous substances.
- Understand the reasons of hibernation, aestivation and birds migration.
- Appreciate the grandeur of Allah and his limitless power.



Life Issues

- Protecting the threatened species against extinction.



Multiplicity of environments where living organisms live were the most important reasons lead to the living organisms diversity in order to cope with the environmental changes such as Climate change, food diversity, and existence of water.

Activity 1 (A camel pad and a horse hoof)

- Describe the camel pad ....
- Describe the horse hoof ....
- How much do the camel pad and horse hoof cope with their environment? ....
  ....
- The camel pad ends in a thick flat one to enable the camel wondering through the hot desert sands where as the horse hoof ends in a strong solid end to help the horse go through the rocky soil.



Camel pad



Horse pad

- Conclusion: The structure of the camel pad and the horse hoofs cope with the method of motion and the environment condition where each of them lives this is known as adaptation.

Example:

What will happen if the camel exchanges its ped with a horse's hoof and vice versa? ....

Adaptation

Is a modification in a living organism or its body structure or even the biological function of its organs to become more adapted to the environmental conditions where it lives in.

Types of adaptation

A. Structural adaptation (anatomical): it studies the structure of one body organ such as the horse hoof and camel pad structure.



B. Functional adaptation: The ability of some organs and tissues to do a specific function such as secreting sweat in case of high temperature as in human and secreting poison as in snakes.

C. Behavioral adaptation: As in bird migration or some animals are active in different times of the day light such as the active birds during the day and night.

Reasons of adaptation:

However, the multiplicities of conditions which living organisms response in all types of environments on the earth, the reasons of adaptation to get food remain the most important ones, then the motion way which helps the animal do that and enables it to escape from its enemies in dangerous situations. For plants, most plants are adapted to the different environmental conditions:

First: Adaptation and Motion:

Adaptation and motion diversity in mammals.

Mammals live in varied environment, these environment force them to move in different ways. Some mammals walk using the four feet, others fly and others swim or dive in water. Mammals' limbs are largely modified to answer the desired (required) motion.

Activity 2 (Motion diversity in Mammals)

Look at the following pictures of mammals then work with your classmates to answer the following question.

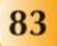

Whale


Bat


Gorilla


Horse







How much does the method of motion suit the animal environment and its living style? ....

What are the modifications taken place in the limbs of this animals to enable them moving in different ways? ....

- Record your observations: ....
- Conclusion: ....

Way of movement varies in mammals either swimming, flying, running, or climbing. However, the limbs of all these mammals are structured with similar bones, some modifications had happened to these limbs to match up movement and the animals style life and also to match with the dominant environmental conditions.

Modification of front limbs in mammals:

- Paddles of whales and dolphins for swimming
- Wings of bats for flying .
- Legs of the horse for running.
- Long arm of monkeys for climbing and catching things.

- Conclusion: Modifications in mammals' limbs enable them to move in different ways that match with their environment and life style.

Second: Adaptation and nature of food:

1. Adaptation and food variety in birds:

Birds spread out all over the known environments on the earth, thay adapt to their environments and the way of having food through different ways such as the modifications in their beaks and legs.

Activity 3 (Examining models of birds' beaks and legs)

Examine a group of birds' beaks and legs shown in the picture... Discuss your classmates how much are the structure and shape of birds' beaks and legs matching up with the condition of the environment and the food type that the bird depends on.

- Record your data: ....
- What do you infer? ....





Bird's beaks and legs are modified and varied in their structure according to the food type and environmental conditions they have for example:

1. Predatory such as hawks and vultures that have sharp and strong crooked beaks to enable to tear the prey. These birds have four fingers end in strong and sharp claws: of these strong fingers, there are three front fingers and a back one. All these fingers are able to bend to control pouncing the prey.
2. Birds feed on shallow water worms and snails have long and thin beaks to pick up worms and snail. Further more, they have long and thin legs ending in thin fingers to walk in the existence of water.
3. Water birds such as ducks and geese which feed on mosses and fish have wide indented beaks in the two sides to help them filter the food from water whereas their legs are palm to help swimming.

- Conclusion: Modifications of birds' beaks and legs are adapted to the food types and the way of movement.




Drosera


Dieonea

2. Adaptation in Insectivorous plants:

Predacious plants are self - feeding green plants that can perform photosynthesis and make carbohydrates such as any other plants. These type of plants can absorb the nitrogenous substances needed to form proteins so some parts are modified in order to pounce and digest the insects then absorb the nitrogenous substances that their bodies need. Drosera, dieonea and halophila are examples of these plants.


Halophila

Third: Adaptation and environmental:

Examples of adaptation in living organisms with the environmental changes:

1. Hibernation:

In winter, when temperature is decreased, some animals hide in burrows such as some reptiles and some insects, or bury themselves in mud, stop feeding and their activities are decreased, as frogs, to overcome the decreasing of temperature.


Tree frog

In spring, when the environment conditions become favour, these animals return back to their normal activities.

2. Aestivation:

In summer, when temperature rises up, especially in desert areas, living organisms face an extreme rising in temperature and a shortage in water and rains. These organisms become dormant and hide in humid burrows in order not to be affected by rising of temperature.


Jerboa

Examples of animals that undergo aestivation are jerboa, desert snail and some other insects.

Optional Activities:

- Collect some pictures of different kinds of birds which live in your local environment, then write shortly about the adaptation of each one's legs and beaks and its survival style.

3. Birds migration:

Some species of birds are adapted to the environmental conditions by migration from cold and polar regions, during winter, to more lighted and warmer regions for reproduction then, they return back to their original habitats in favour to the climatic conditions in spring.



Enrichment information

- Animals that hibernate or aestivate store an amount of food as fats in their bodies to provide them with energy needed to keep their life during the period of dormancy. Fats other than the other kinds of food by production of large amounts of water on their reusing, so these animals store food and water together in the form of fats.

These birds inherit this behavior where they migrate into the same places at the same times every year. Example: quail bird.







4. Adaptation for hiding:

Some animals can colour themselves with the dominant colours in the environment, so they become no prominent aim for their enemies, as the leaf - insect which is hardly discovered by its enemies because it looks like the plant leaves exactly in colour and shape of wings, and the stick - insect which looks like the branches of plants as well.



Stick insect



Leaf insect

Chameleon colours itself with the dominant colours of the environment to be hidden from its preys of insects to capture them and feed on.

Camouflage: is the ability of some living organisms to be hidden from their enemies or to capture the preys in the predatory species.



Chameleon

Optional Activities:

By the help of the available books in school library or the internet, write a research in one of the following topics:

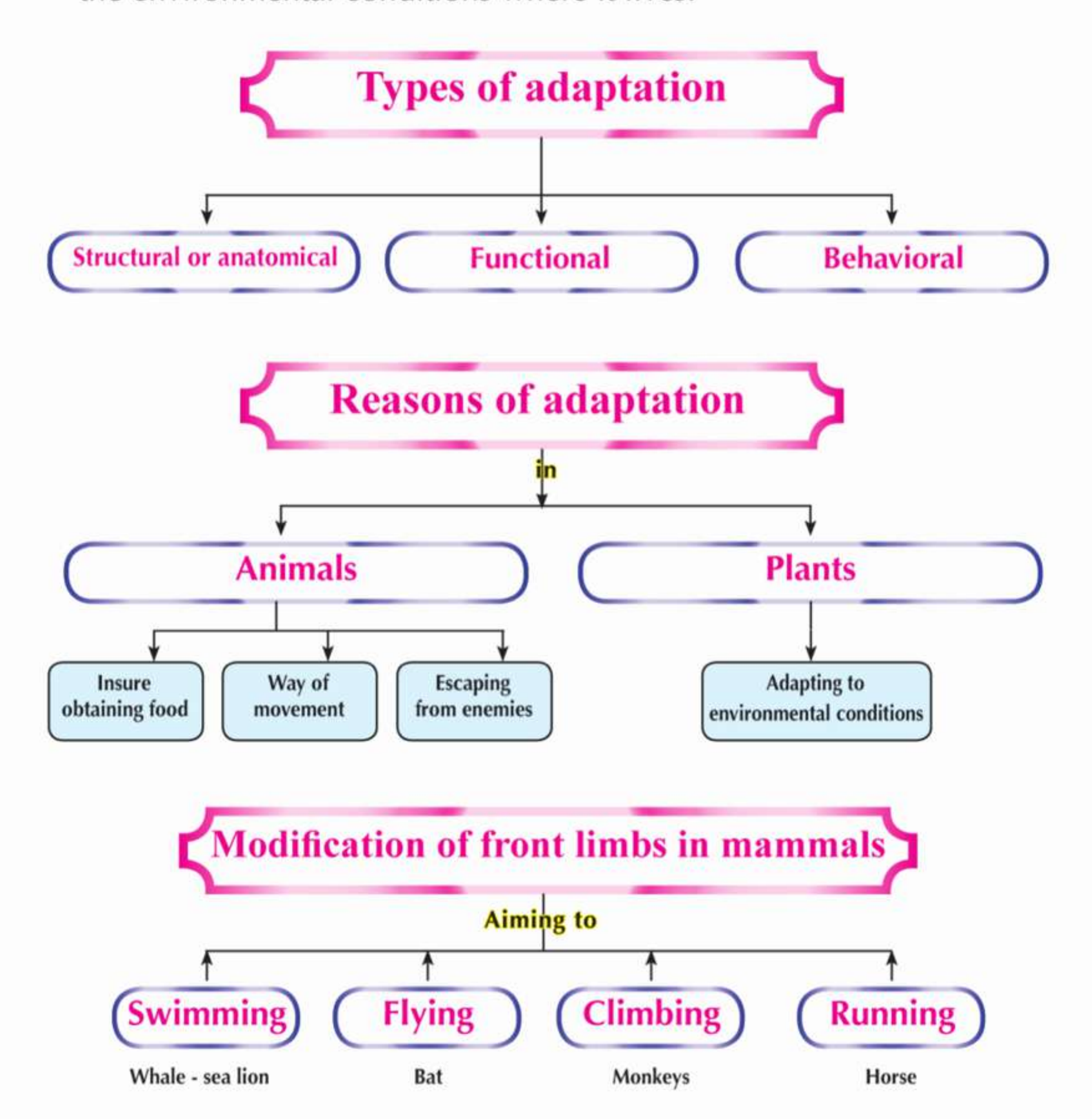
- Camouflage in insects.
- Extinct endangered species and the necessity of their protection.

Camel is the desert ship

Camel is considered as one of the most adapted animals to live in deserts. It is also considered as an example for the structural, functional, and behavioral adaptations that helped it live in the hard conditions of desert.

Summary

- Adaptation: is a modification in behavior, structure or the biological function of a living organisms organs become more adjustable with the environmental conditions where it lives.



Exercises

Question 1:

Complete the following:

1. ....and .... are examples for Insectivorous.
2. Hawks have .... beaks to tear the prey, whereas ducks have .... beaks to filter food from water.
3. Horses limbs end in .... to run over rocky soil where as camels limbs end in .... to walk on hot sandy soil.
4. The whale front limbs are modified into .... to perform .... to take the role of .... whereas they modified in the bat into .... to take the role of ....

Question 2:

Compare between the functional and anatomical adaptations and give an example to each of them.

Question 3: **Give the reason:**

1. Some birds have long and thin beaks, and their long legs end in thin toes.
2. Some plants pounce insects.
3. Some animals undergo hibernation.
4. Some species of birds migrate form their original habitates in winter.

Question 4:

Give an example showing each of the following:

1. Camouflage in insects.
2. Hibernation in amphibians.
3. Aestivation in rodents.

Self reflection and self evaluation

Dear student, as you finish the study of this lesson try to fill in this card:

A. What are the items you like in this lesson?
....

B. What are the items you dislike in this lesson?
....

C. What are the difficulties you have faced when carrying the lesson activities out? ....

Unit 3: General Exercises

Question 1:

Choose the correct answer:

1. .... and .... are examples for micro organisms that live in water.
2. The number of jerboa's upper jaw incisors is .... and their number in the rabbit's upper jaw is ....
3. Armadillo belongs to .... mammals and the hedgehog belongs to .... mammals.
4. .... is from the plants that reproduce by the formation of spores whereas .... is from the plants that produce seeds inside cones.

Question 2:

Choose the correct answer:

1. The number of the anterior fingers in a hawk is ....
   (3 - 4 - 2 - 1 finger).
2. .... belongs to the animals with no body support.
   (Octopus - Mussel - Hedgehog - Snake).
3. The examples of living organisms that undergoes hibernation is the
   (desert snail - jerboa - frog - all the above).
4. Pea plant belongs to .... plants.
   (fern - monocotyledon - dicotyledon - gymnosperm).
5. .... is from the rodents that undergo aestivation.
   (Rat - squirrel - Jerboa - Desert snail).

Question 3:

Give one difference between each of the following:

1. Insects and arachnids.
2. Rodents and lagomorphs.
3. Beans plant and maize plant.





Question 4:

Give reasons for:

1. The individuals of the same species differ in some external characteristics.
2. Some animals undergo hibrenation.

Question 5:

What do you expect in each of the following cases:

1. Polar bear can't undergo hibernation.
2. The aestivated animals don't store their food in the form of fats.
3. The beaks of a hoopoe and a hawk are mutually exchanged.
4. Predatory plants can't capture insects for a long period of time.

Question 6:

Give an example to show the adaptation of the following living organisms with the environmental conditions:

- Duck.
- Heron.
- Hedgehog.
- Dieonea plant.

Question 7:

What are the results based on the followings?

1. The variety of the ways of motion in mammals.
2. Increasing the well known species of living organisms.